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ACORN USER
JUNE 1986
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on your micro
DISC FILING:
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for Acorn's ADFS
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Fleet Street and
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NETWORK NOTES:
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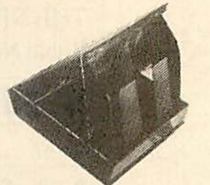


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ISSUE No 47 JUNE 1986

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Subscriptions: Contact Christine Allen, Redwood Publishing Ltd, Lambourn Woodlands, Newbury, Berks. Tel: (0672) 40888. UK £17.50; Europe £25; Middle East £30; Americas, Africa £35; rest of the world £40 (prices include p&p for 12 issues). Published by Redwood Publishing Ltd, 141-143 Drury Lane, London WC2B 5TF. Tel: 01-836 2441. Printed by Watmoughs Ltd, Bradford. Typesetting and colour reproduction by Publishers Reprographic Services, London. Print production by Aquarius Print and Design, London. Distributed to the news trade by Comag, Tavistock Road, West Drayton, Middlesex UB7 7QE.



FEATURES

COVER



Cover photograph by Barbara Bellingham

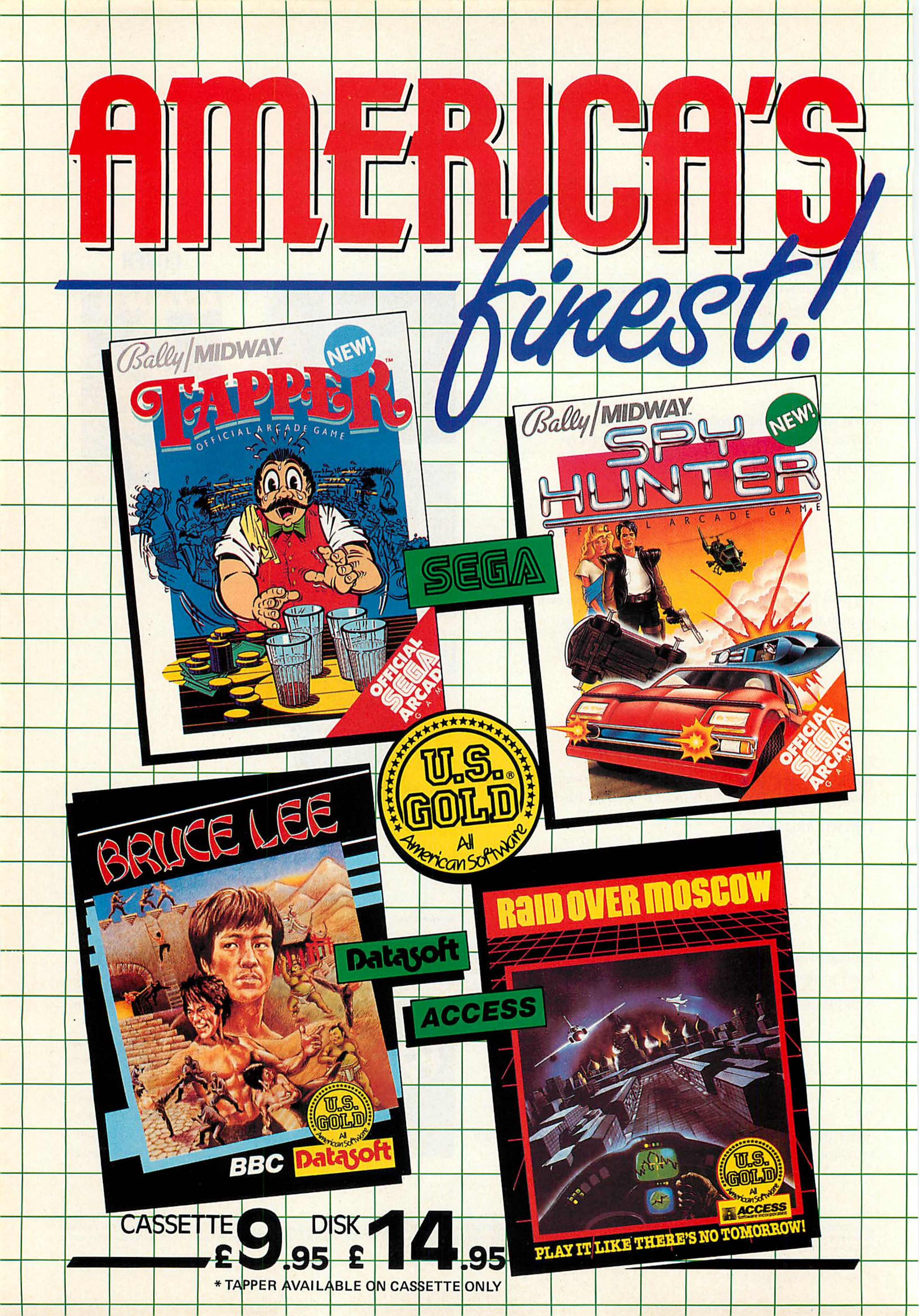
NEXT MONTH

THE DISC DIMENSION: We focus on drives and utilities, including a 1770 guide

Word puzzles – how to create and solve them on your micro

Beyond Mandelbrot: Newton's equations produce more spectacular graphics

Your chance to voice your opinions in our reader survey


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Acorn's BBC Master Series bring exciting new levels of sophistication to a proven family of micro computers. Unfortunately, not all monitors on the market can do justice to the Master Series' colour display capabilities.

That's why more BBC users choose a Microvitec CUB colour monitor than any other – because every model in the CUB family is a masterpiece of high performance British design. The clarity, depth of colour and rock steady image seen on a CUB display allows the user to exploit graphics and text to the full – just ask for a demonstration of a CUB alongside someone else's monitor and you'll be totally convinced.

In the meantime, the picture above amply demonstrates why a CUB is a delight to the eye in more ways than one.

Model	Resolution	Screen	Bandwidth	Application
1431/DS4	Standard 452(H) x 550(V)	–	18 MHz	Education, Home, Colour graphics use
1451/DS4	Medium 653(H) x 550(V)	Anti-glare	18 MHz	80 column, text-processing. High quality graphics.
1441/DS4	High 895(H) x 550(V)	Anti-glare	18 MHz	High-resolution graphics and text applications.

Available with tilt and swivel option. Also available are Microvitec's range of popular BBC-compatible metal cabinet monitors 1431/MS4, 1451/MS4, 1441/MS4.

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NEWS

Number one spot for Acorn User

Readers have voted with their cash in newsagents and dealers around the country to confirm *Acorn User* as the number one Acorn-specific magazine.

Circulation in 1985 averaged 57,051 copies per month – more than 1500 ahead of the nearest rival according to the latest ABC figures. And that lead is boosted by issue sizes bigger than the rest: more space for articles, reviews, listings and tips.

And ideas which have made *Acorn User* so popular such as the yellow pages, special issues and quality of listings have, we hope, helped to raise the standard of computer magazines in general.

We plan to maintain our traditions for these and other features, and introduce more.

And Acorn itself has stamped its seal of approval upon the Acorn User Exhibition by picking it as the only user show to attend in London this year.

So it's a big thank you from the staff of *Acorn User* to all the authors, readers and advertisers who have made the magazine such a success. We hope you will continue to do so.

Evans released

Nick Evans is the latest *AU* author to release a book. *The Future of the Microcomputer in Schools* comes out in July priced £8.95 from Macmillan.

Hoax advert

One of the small ads in our April issue appears to have been a hoax. It was placed by 'Piet Simon' and the address turns out to be a student pigeon hole at Essex University. We advise readers who replied to this to cancel their cheques. Post is being intercepted and the police called in.

Master demand outstrips supply

Demand for the Master 128 has been 'significantly higher' than Acorn expected and customers are facing a wait of a month or more for an order.

Despite the company's attempt to increase production by flying-in vital components, managing director Brian Long admitted that the level of demand had been an 'embarrassment' when announcing Acorn's results for the past six months. And the same problem has hit orders for the Turbo co-processor and Econet upgrades.

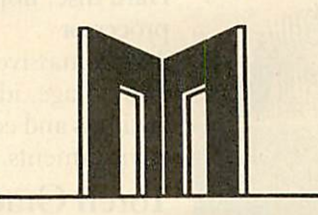
Sales boss Joe Black made a tour of dealers in April to assess the true level of demand. At the same time he assured them that there were no problems with production – there were just not enough components in stock.

Phone calls to *Acorn User* from the public and dealers all made the same point: they couldn't get any Masters. Dealers felt that Acorn was losing sales because there were no machines to be had.

Jay Mehta of London dealer Technomatic said: 'We've only had about a fifth of the machines on order, and I've been told we are one of the better-off dealers.'

At Twillstar it was the same story. Mrs Amarjit Dhesai said: 'We have had to turn people away, and are only taking orders with a deposit. There are 700 orders pending and about 2000 customers who are interested. We're being threatened by the Advertising Standards Authority.'

Viglen's Vig Boyd confirmed the situation: 'They're supposed



to be producing 5000 a month but there's no evidence of it. We just get them in dribs and drabs.'

Joe Black defended Acorn simply: 'We made our best estimate last year and that's the number we are producing. We got it wrong. We're not producing enough.' Fulfilling orders from schools had been the first priority, he said, and that was now out of the way.

He admitted: 'There is no doubt that some people who planned to buy a Master have gone elsewhere'.

And project manager David Bell was keen to reassure readers that everything was being done. 'We're flying in power supplies to speed things up, but there's a lead time of 16 weeks on some computers. His message to readers was: 'Try ringing around the dealers. The position is easing by the week. It's worth the wait.'

● Despite the delays, peripherals for the Master are appearing. Acorn is to market a 'bridge-style' double disc drive unit for £325. And Viglen is building on the success of BBC consols with a Master version. Companies with new Master software include Advanced Computer Products and Ibbotson with the *Imagina* publishing package.

The 512 MSDOS Master is still expected to be on sale in July and a reference manual covering the OS and filing system calls should now be available for £14.95. The Advanced Reference Guide is scheduled for the autumn.

Viglen announces low cost 20Mb Winchester

Viglen has announced a 20Mb Winchester hard disc which plugs straight into a Master and costs just £795 complete.

The drive comes in a standard double disc drive box with power supply and fan, and larger versions are on the way. In fact, the Winchester could be mistaken for a double floppy drive, but there are no slots for the standard discs (the hard disc is fixed).

The Winchester uses the BBC's 1MHz bus under the micro, leaving the usual disc interface free for floppy drives. It is treated as drive 4 by the filing system (drives 0-3 being for standard floppies).

The Viglen Winchesters rely on the Advanced DFS (ADFS) which is standard on the Master, and is supplied with the Viglen drive for model B and B+ owners. The Winchester can be accessed using the old 8271 disc controller in the model B, and just requires a different format disc for utilities.

One 20Mb drive will hold as much information as about 30 standard 80-track double sided discs, or 16 ADFS double density discs. The access time is up to 10 times faster than floppy drives.

Torch mail order price breakthrough

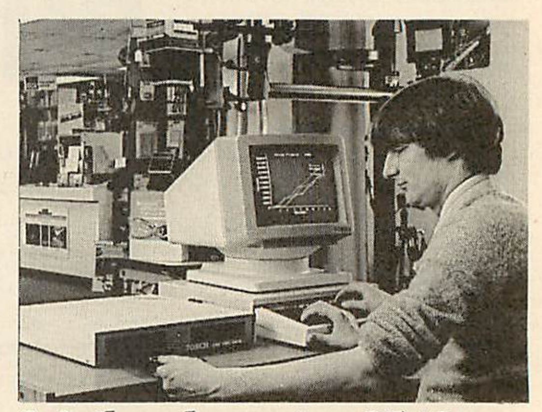
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Complete the order form today or telephone (0223) 841000 with your VISA/ACCESS card number.

Torch Z80 owners send a cheque for 1986 upgrade pack, only £29.95 including VAT and P & P.

TORCH COMPUTERS

Torch Computers Ltd., Abberley House, Great Shelford, Cambridge CB2 5LQ.
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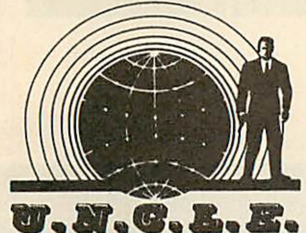
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MAIL ORDER FOR A LIMITED PERIOD ONLY

THE MAN FROM U.N.C.L.E.



Has Uncle Clive succumbed at last? The desperate need for ackers has driven him to accept the grubby fivers of Alan 'Bully Boy' Sugar, king of Amstrad and master of the UK home computer industry. So far, no definite role has been assigned to him, but the world expects him to be employed as resident guru.

What he might want is as little competition as he can get, and having the country's only serious threat in his back pocket must be comforting. It's still a bit puzzling, though. Amstrad has shown itself more than a match for the competition over the years, so there must be something else worth having. No, I don't think it's Uncle's creative genius. People-powered gumshoes and televisions for Lilliputians are creative, but do they spell genius?

Amstrad has succeeded by keeping its corporate feet right where they belong – on the ground or up somebody's backside. Innovation is what other people lose money doing and what Amstrad makes money copying and repackaging.

Staying with Uncle Clive for the moment, I was reading an article by a bloke who claimed that the QL's microdrives are faster than everybody else's disc drives! That I can believe with the Commodore or Atari, but not the Beeb? Shurely shome mishtake? Unless, of course, he was using the Acorn DFS. Ah, that deep soporific rumble and chug as you while away the time crocheting your own version of the Bayeux Tapestry. To be fair, it is possible to achieve a reasonable speed on the Master or by poking around in the innards of the Beeb – or by buying a decent DFS.

Telesoftware service set for expansion

by Geoff Nairn

The telesoftware service pioneered with the BBC micro is set for massive expansion with the creation of three satellite channels carrying teletext information.

A new division of the BBC called Datacast has been set up to exploit the potential of the new channels, each of which can carry three times as many teletext pages as Oracle from ITV and Ceefax from BBC.

Until now, teletext has been free, but subscribers can be charged under the new system as data can be encoded and the unscrambling hardware for TV sets and micros charged for (*AU*, Sept 1984).

Lawson Brown head of data broadcasting at the BBC has been broadcasting free programs for Beeb owners with teletext adaptors for the past three years. He said the BBC was 'seriously looking' at subscription-only business telesoftware but was also committed to expanding its telesoftware service for BBC owners.

The Independent Broadcasting Authority (IBA) is offering three direct broadcasting by satellite (DBS) channels which will beam down TV pictures and teletext pages from satellites to micros or televisions equipped with a receiver and dish aerial.

Contractors who bid for the channels can broadcast data on top of a standard TV picture, including teletext pages, computer data, enhanced stereo sound, and extra picture information for new wide-screen TV sets being developed.

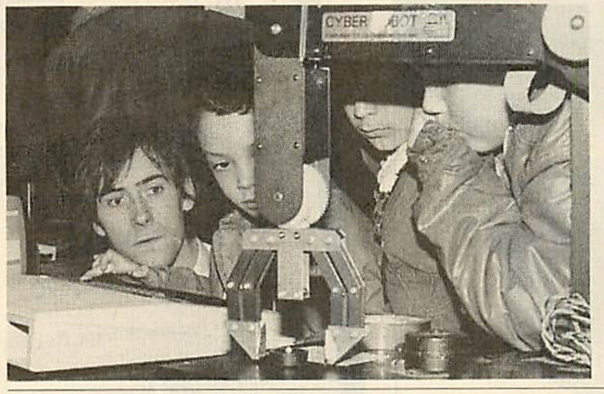
Just one sound/data channel can carry three times as much teletext information as Oracle or Ceefax, and at 10 times the speed of the telephone-based Prestel.

The two main public teletext services, ITV's Oracle and the BBC's Ceefax, have been restricted to 100-200 pages of information, including about a dozen pages of telesoftware.

But Oracle has now leased out one of the seven teletext lines at the top of each TV picture on ITV1 to Aircall, which will use it to broadcast high value information such as stock market prices.

The BBC has similar plans to lease one of its Ceefax screen lines on BBC1 to commercial customers, but as a more flexible 16kbaud non-teletext data channel. Possible applications include financial information, stock control for retail stores, and security systems.

Starstream Teletext which provides teletext pages for the cable television wants to set up closed groups of business subscribers.



Beebs in the books

The peace and quiet of libraries in Harringey, North London, was shattered when over 150 children eagerly fought to get their hands on BBC micros, robot arms and turtles.

The Interaction Community Computers scheme toured the borough's libraries during the Easter break. Groups of schoolchildren used Beebs for projects including designing a newspaper using AMX *Pagemaker*.

Contact Bruce Edmonds on 01-511 0413.

Making movies by micro

Movie Maker is a graphics animation program for the Beeb based on two ROMs.

It allows users first to draw background scenery using the cursor keys, and to then superimpose figures, constructed from teletext graphics characters, on the scenery.

The arms and legs of the figures can be programmed to move, and the figure's shape and colour can also be changed, resulting in an animated film.

Movie Maker costs £29.95, but for only £1.95 you can buy a demonstration cassette and introductory brochure. This is refunded when you purchase the full package.

Contact Slippery Slug, PO Box 83, Bath BA1 1ZA.

Magik in the air

Level 9 has released its latest adventure game for the BBC micro – the *Price of Magik*.

The game is the follow-up to *Red Moon* and offers more spells, more independent creatures, a 1000-word vocabulary and full-sentence commands.

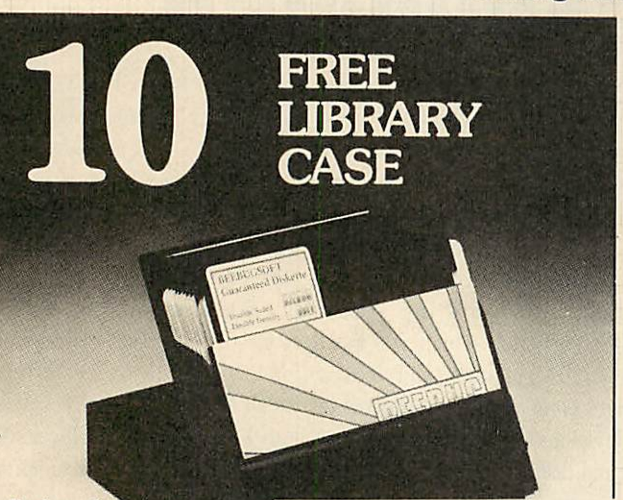
Price of Magik costs £9.95 on tape from Level 9 Computing, PO Box 39, Weston-super-Mare, Avon BS24 9UR.

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96 TPI		DOUBLE DENSITY	
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25 S/S D/D	£43.50	25 D/S D/D	£46.20
50 S/S D/D	£77.90	50 D/S D/D	£84.90

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Competition winners

December's competition inspired a response of around 450 entries. Apologies for the gremlin which crept into question 4. A*B=8 should have read A+B=8. We accepted all who said one or more of the following: a) You mean A+B; b) A−B + 8 gives two solutions; c) it's insoluble.

The answers were as follows:

1) Mark, Amstrad, Tuesday, 32016; Julian, Spectrum, Wednesday, IBM; Richard, Apple, Thursday, Amiga; George, BBC, Friday, Macintosh; Henry, C-64, Saturday, Atari ST.
2) Basic, red; DFS, purple; *View*, orange; *Communicator* Green; OS, yellow.
3) 5 Somerens = 1 Quinn
4) 7152638 (if A+B=8)
5) ADDD = 1999, AACA = 1171, BCDB = 3793, BDAC = 3917
6) 68782 + 68782 + 656 = 138214

The winners of the Opus Challenger 3 disc drives were S Stevenson of Bangor, A Pimms of London, Wilson Park of Edinburgh, T Barnes of Oldham, and D J Barron of Bristol.

January's competition produced a very high entry – nearly 1000. The answers were:

1) The longest chain is formed by 154 and 144.
2) 8,439,739,020 (96420 *.87531)
3) INVENTORY = 317214568. Cube root = RYE.
4) OCTOBER = 9829173

The winners of a Taxan Vision 2 colour monitor were J Smith of Cambridge, J Azagury of London and E Stevens of Sheffield.

February's answer was Chief Engineer, Baker, £6.60; Machine Operator, Andrews, £5.45; Supervisor, Curtis, £6.60; Marketing Director, Arnold, £2.65; Production Head, Williams, £3.25. The only superfluous statement was the first part of statement 10.

The 25 winners of Bruce Smith's *Advanced Reference Guide to the BBC Micro* have been notified.



Natural History Museum: BBC micros will catalogue botany specimens

Sheffield's micros for minorities

BBC micros are spearheading an ambitious project in Sheffield to bring information technology to those who have traditionally missed out.

Asian women and the unemployed are just two of the groups who are using micros as part of the city council's Sprite project – Sheffield People's Resource in Information Technology.

Three community groups have so far been earmarked to receive hardware, software and help from the project, but Sprite's Steve Jackson stressed that it is up to the groups to decide for themselves just how the resources are used.

It's early days for the project and only one community group, an 'open door' centre for the unemployed, has so far received equipment – including two BBC micros. Jackson said: 'At the moment the computers are being used mainly for recreation, but the group wants to use them for producing posters and other printed material'.

The Sprite project is increasing the computer awareness of Asian women, who are using the Micro Praxis Urdu wordprocessing package for the Beeb, and it has plans for using BBC micros with the mentally handicapped.

Funds are short and Sprite is appealing for unwanted computer equipment. Further details on (0742) 750349.

Gemini launches newspaper

Gemini Marketing is to enter the newspaper business – but the Eddie Shahs of this world need have no fear, for the newspaper will concentrate on Gemini's products for the Beeb.

The newspaper, provisionally titled *Gemini News*, will be sent out to the company's 50,000-60,000 customers free of charge and will contain 24 A3-size pages of product details and technical information plus some editorial on using Gemini products.

Museum buys network for cataloguing

The Natural History Museum has bought a network of BBC micros and Torch machines for the massive task of cataloguing its botany specimens.

The botany department has 5,000,000 plants and flowers, many of them dating back to Victorian times. Incredibly, it has no index of its specimens – not even on card. The network aims to change that – at least for the more important specimens.

First, the museum's prestigious Linnaeus collection will be put on the network. Carolus Linnaeus developed the modern classification system for plants and his collection is frequently referred to by scholars.

The Torchnet system uses four Torch machines and one BBC micro connected to a 20Mbyte Unicorn hard disc. But Richard Pankhurst, head of the department's computer section, fears that 20Mb may not be enough even for the relatively small Linnaeus collection.

He said: 'We will only computerise the frequently used specimens. Apart from the lack of storage, it's too labour-intensive to catalogue the whole collection.'

The network is used by 20 people in the department and contains several other small databases, including a bibliography of research reports.



London's Natural History Museum

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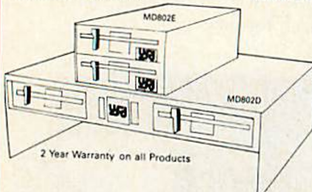
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MODE EXPOSITION

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2. Double Mode
In the double mode the same data which has been received is sent to two printers simultaneously and printed out. Copy print is also available by pressing the COPY key.

3. Free Mode
In the free mode the command VT and FF code are read as a data fill end code. Of the two printers the data is automatically sent to whichever unit is free for service first. This means that the print time of a amount of data is minimized by using two printers without regard to the data list size.
NOTE: This means that if you try to print two reports at the same time, on two printers, the printers may intermix pages.

4. Command Mode
In the command mode the operation is similar to the manual mode. Data sent is not determined by the SELECT key, but by a certain command the required printer is selected and the number of copies is assigned. This command is internally processed as a control code and is not output.

5. Clear Key Mode
The clear key mode is furnished for cleaning an error occuring during the printing *and data input*. The function is to stop the printer *currently under operation* and erase the copy count. However, only the last data input remains and can be reprinted by pressing the COPY key.

FEATURES
1. A printer currently under operation is indicated by an LED, and therefore is immediately known.
2. The copy capacity is available up to 255 sheets. The number of copies expressed in a binary mode by LED (up to 15).
3. The Buffer is furnished A 64K RAM as standard, optionally expandable in increments of 64K, up to 256K and can be connected to most printers and CPU's.

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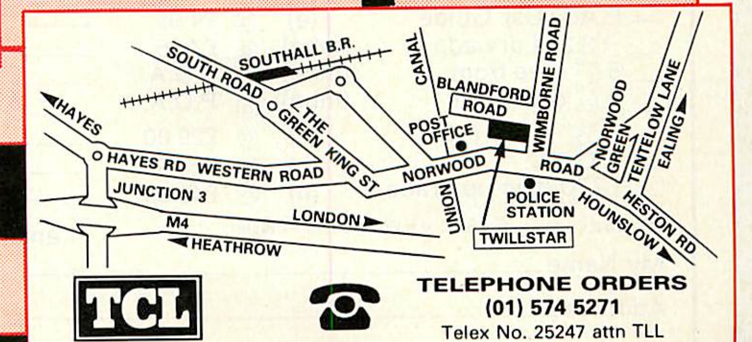
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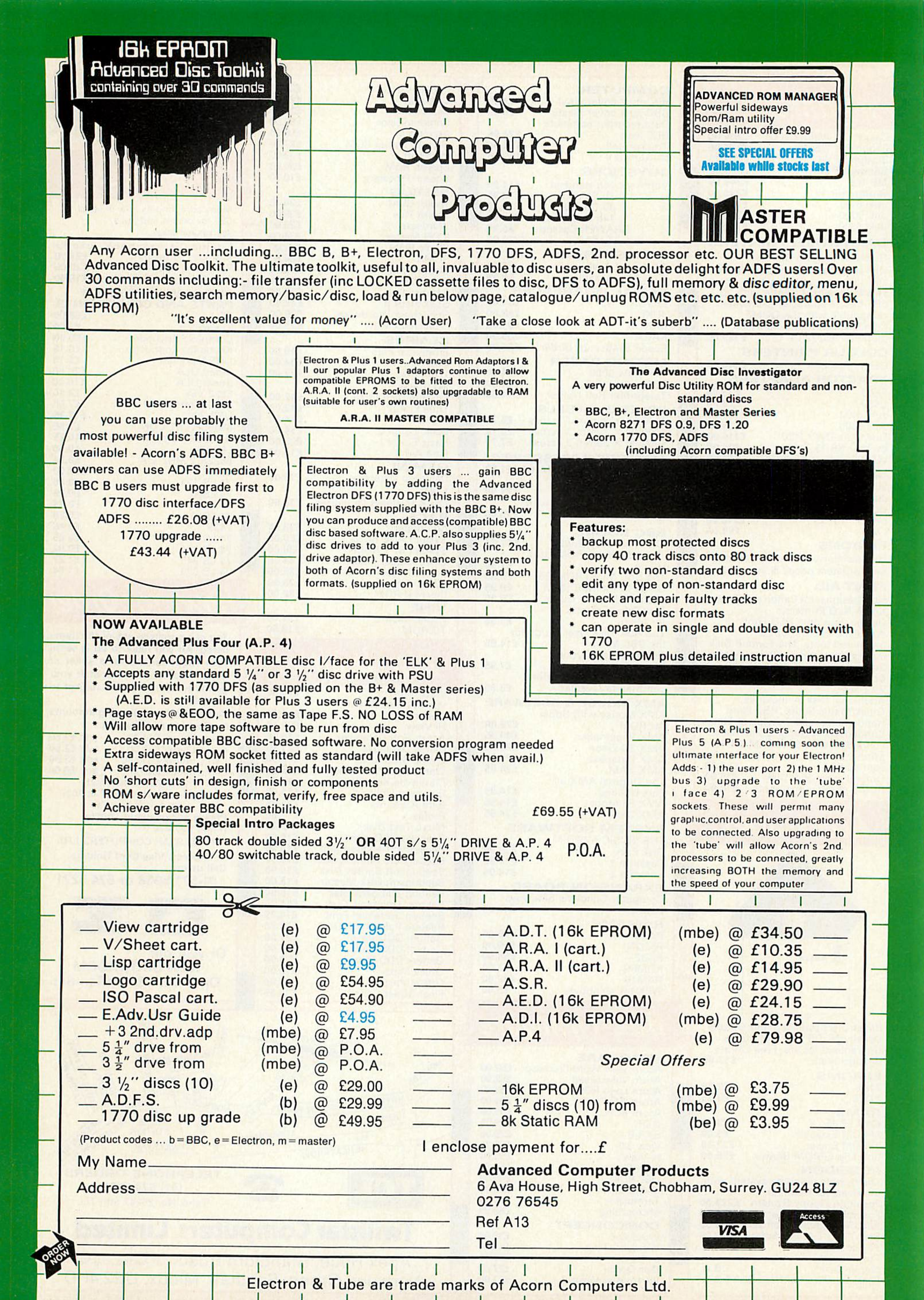
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Advanced Master DFS – first ROM for the Master

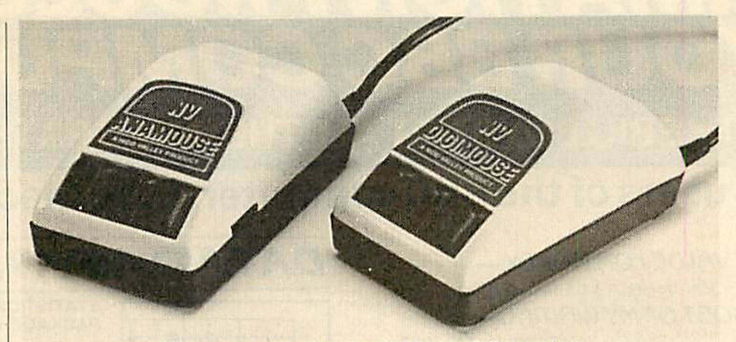
Advanced Computer Products is releasing what could well be the first ROM specifically for the Master. The *Advanced Master DFS (AMD)* is a 16k ROM that can use the four sideways RAM banks as a silicon disc, and includes a number of utilities.

The *AMD* allows 62 files per disc in DFS mode, twice the number permitted on the standard Acorn DFS. Auto-file relocation ensures that messages such as 'Can't extend' do not occur. You can also format across both sides of a double-sided disc (using a *FORM160 command) so that the disc appears as one long side thereby enabling you to have single files up to 400k in length (640k in double density).

Workfiles can be defined with *WORK <filename> and all subsequent file loading and saving will be directed here if no filename is specified.

Readers should be able to purchase the *AMD* this month, or see it in action at the *AU* show. BBC B, B+ and Electron versions should be available in the summer.

Phone ACP on (0276) 76545.



Anamouse and Digimouse: hope to take a bite out of the market

Bar code program bags first prize

A program for the *Acorn User* bar code reader has won a major software trophy.

First prize in the junior section of the Kent Software Trophy went to Barry Wimlet of Queen Elizabeth School in Faversham. Barry's program allowed the bar code reader to be used to enter data directly into a bar code filer database. His school has already used it to co-relate sightings made on nature trips. Barry's reward was £400 and a trophy. His school receives £1000.

Although over 90 per cent of the entries where based on a BBC micro, the senior prize went to Dennis Parrott of the Robert Clack School for his stock control program for the QL.

Other major BBC micro prizewinners included Jonathan Braithwaite and Karl Edwin of Huxlow School. Their entry was business orientated, producing a graphical display of the location of employees throughout the world.

The Robert Clack School produced another winner in Peter Slaney's bar till management system which uses a light pen. The total prize money won by entrants to the competition sponsored by Barclays Bank was over £8000, and the DTI provided an extra £5500. Judges included *Acorn User's* Bruce Smith.

Mice nibble at market

Nidd Valley Micro Products has come up with two new mice.

Digimouse is a digital mouse and it claims full compatibility with many Beeb graphic and wordprocessing programs.

It has three keys on top and comes with machine code routines for incorporation into a user's own programs.

And then there's Anamouse, a breed designed for analogue applications where its high positional accuracy comes into its own.

Anamouse has a thumbwheel built into its side which gives it a third control axis.

Both retail at £34.95 and will work with the Master.

Nidd Valley Micro Products, Stepping House, Thistle Hill, Knaresborough HG5 8JW.

Welsh Edword

Clwyd Technics has produced a Welsh version of its *Edword* educational wordprocessor for the Beeb. *Edword Cymraeg* costs £45.95 and comes with Welsh documentation from Clwyd Technics, Unit 4B, Antelope Ind Estate, Rhydymwyn, near Mold, Clwyd.

POST A PROBLEM

AS a result of pressure from readers, *Acorn User* now guarantees a fast reply service for enquiries. Your answer will be returned within 10 working days for just £2 (includes VAT), or your money back.

The idea is simple. Just write out your problem, fill in the coupon (right), and send both off to *Acorn User* with a stamped addressed envelope and cheque or postal order for £2. (If you want recorded delivery, add the cost of this on. The same goes for overseas readers.) Include as much detail as possible and a disc or cassette if a program is involved – with enough space to record any corrected listing.

We will then answer the problem and return all material received – within a guaranteed *10 working days* from receipt. If we fail to match this promise your cheque or postal order will be returned with the answered question. If we cannot answer the problem, the cheque will be sent back to you.

If you want a listing debugged, advice on hardware or software, or a list of addresses, send us your problems.

ACORN USER READER SERVICE
141-143 Drury Lane, London WC2B 5TF

Name ....

Address ....

....

....

.... Postcode ....

Daytime phone number..

I enclose a cheque/postal order for £2 and an sae with my problem.

OFFICE USE ONLY Date in:
Date out:
Answered by:

4th OFFICIAL ACORNUSER Exhibition

The Fourth Acorn User Exhibition takes place at the Barbican Exhibition Centre, London, from Thursday July 24 – the day after the Royal Wedding – to Sunday July 27.

Prince Andrew and his bride unfortunately will not be there as they are otherwise engaged – or rather, by that date, married. But anyone who's anyone and owns an Acorn computer undoubtedly will. Some 30,000 people are expected to pass through the doors of the Barbican's Hall A on Golden Lane over four days, and by early April over 50 exhibitors had already signed up to display their wares.

The organisers, Editionscheme, said that the large number of exhibitors already signed up and the volume of ticket enquiries from the public showed renewed confidence in Acorn. Mark Simon said: 'Acorn is back on its feet and we expect to break all records this year.'

Entry on the door is £3 (£2 for children), but you get £1 off if you buy your ticket direct from Editionscheme. There will be a 50p-off coupon in the August *AU,* with a full show preview. Micronet subscribers can get 50p off admission by downloading a special *Acorn User* frame on Micronet, which when dumped to a printer can be used as a discount voucher at the show.

Opening hours are 10am to 6pm – apart from Friday, when the show stays open until 8pm, and the last day, Sunday, when it shuts at 4pm. However, Thursday morning (to 1pm) is trade-only.

Contact Mark Simon at Editionscheme, HR House, 447 High Road, Finchley, London N12 0AF, or phone 01-349 4667.

First showing for new Acorn micros

Acorn is to show the Master 512 and its badged version of Olivetti's IBM PC clone, the M19, to the public for the first time at the Acorn User Exhibition (see left for details).

And it will be the only chance to see Acorn at a London show for the rest of this year, apart from PCW in September.

Acorn will be selling the 512k version of the 16-bit Olivetti micro as the Acorn PC M19 for about £1500 plus VAT. The only difference from the Olivetti M19 is the badge. The sales target is schools and colleges who want to train students on standard business software.

Alongside the M19 will be Acorn's own 16-bit micro, the Master 512. Three machines will be put through their paces, running a variety of third party business software, though Acorn was cagey about the exact titles.

David Bell of Acorn said: 'We'll be showing the GEM operating system, a database and a spread of other MSDOS packages running on the 512. But the machine is not an IBM PC clone – so there won't be much PC software around.'

There will also be a Master Scientific and a Master Turbo at the show. The Scientific will be pushed to its speed limits running as a fast Basic processor.



M19: a clone by any other name . . .

Master modem

On the Pace stand will be a Master modem to fill that conspicuous gap inside the machine. Price has yet to be decided. Pace has also produced a 16k ROM version of its *Commstar* communications software, with several enhanced features, for £34. And a new Pace autodial/answer modem should be launched at the show.

For the hard-pressed businessman, Wigmore House will be launching Easycall, a comms package for the BBC micro which stores and automatically dials telephone numbers. Price has yet to be fixed.

On the robotics front, Commotion will be showing a sensor pack for its Beasty. It has sensors to detect temperature and rotation, and two proximity detectors. Price is £29.95.

Also from Commotion comes the Micro-Robotics Controller, an intelligent control box with its own built-in programming language and memory, which costs £195 plus VAT.

The Beeb is used as a simple dumb terminal, allowing the controller to be used on its own. Its small size suggests various mobile control applications, ranging from fuel control systems for racing cars to helping the physically handicapped.

Bring on the dancing girls

Peartree aims to turn part of the Acorn User Exhibition into a disco, complete with dancing girls and pulsating disco music. It's all to promote its Music 5000 synthesiser add-on for the Beeb, which supersedes the successful Music 500. Music 5000 is claimed to save a lot of time in programming music over its predecessor. Price is £159.95 including VAT.

Vartan Mundigian of Peartree was quick to deny rumours of topless dancers and other lewd displays. He said: 'The Acorn User Exhibition is a family show. All the girls will be wearing miniskirts . . . it's decent stuff.'

Also promised for the Peartree stand: sideways RAM for the Master based on the credit card memories; school accounting software for networks; and an integrated business package cheekily called 321, offering wordprocessing, database and graphics.

Micro weather

Visitors to this year's Acorn User Exhibition will be in no doubt as to the weather outside, thanks to Timestep Electronics.

Timestep is to set up a satellite ground station, based on a Beeb, inside the Barbican to receive live pictures of the weather over Western Europe.

The two VHF weather satellites operational over the UK can generate six sets of pictures, which can be displayed on a Beeb using modes 1, 2 or 3, using the Timestep equipment.

Also on display at the exhibition will be the *Satfoot* program, which draws the predicted paths of weather satellites on a screen map of the world.

The program works in real time and also shows the satellite 'footprint' – the area where signals from the chosen satellite can be picked up.

NOTICE BOARD

ON SHOW

● May 16-18, Electron and BBC Micro User Show, Royal Horticultural Hall, Westminster, London SW1. Admission: adults £3; under 16s £2.

● May 21-24, Electric Music, Newcastle Playhouse, Newcastle-upon-Tyne. A festival of electro-acoustic music, complete with synthesisers, computers, and weird and wonderful sounds. Contact 091-478 4792.

● June 24-26, Computer '86, G-Mex Centre, Manchester. A different venue for this computer show, aimed at business and professional users in the north west. The new G-Mex exhibition centre was once Manchester's Central Station, and the imposing Gothic superstructure has been retained – should make a change from the usual concrete and glass monoliths. Contact 01-643 8040.

● July 9, Computers in Science, Lancaster Polytechnic, Preston. Exhibition of interest primarily to teachers and lecturers, but open to all. Nominal charge to cover refreshments.

● July 24-27, Acorn User Exhibition, Barbican, London. If you miss all the others don't miss this one – see page 17.

● August 6-11, Festival Expo 86, Computers, Video Software and Games Exhibition, Stoke-on-Trent, Staffs. Part of the National Garden Festival.

ON FILM

● Daryl is a dab hand at computer games, can hit a home run like



Babe Ruth and his flying skills rival those of Chuck Yaeger. Truly the Right Stuff. But he hides a dark past and once you're told that Daryl stands for Data Automated Robotic Youth Lifeforce, you can pretty well guess the rest. *Daryl* opens in mid-May.

FOR HELP

● To contact *Acorn User* authors, write c/o the editorial address given on page 2 of this issue.

● Seikosha AP/GP100 printer help sheets are available from *Acorn User* for 50p, plus sae. These consist of three programs, including a screen dump, and three pages of notes on using these printers.

● Monitor choice: photocopies of the review of four monitors, plus a set of nine test programs from the June 1984 issue cost 72p (inc post). A copy of the issue costs £1.25 (see page 112).

● Bulletin boards: information on 26 free-access boards was given in the October 1984 issue. 54p for photocopy (see page 112).

TO CONTACT

● Acorn, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.

● Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.

● Acorn's bulletin board service is Prestel-compatible (1200/75 baud) and runs on (0223) 243642.

● *Acorn User* cassettes, discs, back issues and binders can be ordered using the form on page 112.

● *Acorn User's* page number on Micronet is 60043765. You can download *AU* software on 600611.

● BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).

● BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send sae.

● Dudley College of Technology is running an educational viewdata system on (0384) 239944. Access is free to the database and it has been designed to simulate a business viewdata system, without the risks of pupils ordering Concorde air tickets or crates of champagne.

● A new bulletin board has come online – the Sharow bulletin board, run by 15-year-old Paul Gilliam from his home in Sharow, Ripon. The service runs on a BBC micro and features an adventure helpline, an amateur radio helpline, BBC B+ helpline and the more usual programs, news and message facilities. The Sharow board operates on 300 baud from 6 to 10pm on weekdays or between 7 and 10pm on Saturdays or 12 to 5pm on Sundays. The phone number is (0765) 5296.

● Bulletin boards: AMRAC (0590) 612130; BB-BBS (0874) 730692; CABB 01-631 3076; CBBS London 01-399 2136; Distel 01-679 1888; Forum 80 Hull (0482) 859169; Forum 80 London 01-399 2136; HAM-NET (0482) 497150; Liverpool Mailbox 051-428 8924; Mailbox 80 (0384) 635336; Milleways (0533) 608442; MCIS 061-773 7739; On-line Systems (0429) 34346; OwlTel (BBC Publications) 01-927 5820; Technomatic 01-0452 1500; TBBS London 01-348 9400; TBBS Nottingham (0602) 289783; TBBS Southampton (0703) 437200.

● MEP (Microelectronics Education Programme) has ceased. Until its replacement, the Microelectronics Support Unit (MSU), is up and running, teachers seeking advice on computers in education should contact their LEA.

● MAPE (Micros and Primary Education), c/o Mrs G Jones, 76 Sudbrooke Holme Drive, Sudbrooke, Lincs LN2 2SF. User group for primary teachers. Please send sae.

● Software Ltd configure CP/M programs for the BBC micro. Write for a catalogue to No 2 Alice Owen Technology Centre, 251 Goswell Road, London EC1N 7JQ. Tel: 01-833 1173.

BLUNDERBOX

● Apologies are due for a problem with the checksum for Alan Crabb's Electron Keys program, published on page 116 of the May issue. The following extra line is required to ensure the checksum is correct:

```
55 FOR X%=&900 TO &AFF:?X%=0:NEXT
```

● Readers may have been experiencing problems with Michael Ginns' SIDEBAS program (April page 112). So that SIDEBAS will work with all sideways RAM boards, lines 2110 to 2180 should be deleted and the following lines added:

```
161 type=&80-F%
162 xstore=&81-F%
163 ystore=&82-F%
164 index=&83-F%
```

● Thanks to M Jennions of Norwich for pointing out a blunder that crept into the MANDEL2 listing on page 114 of the May issue. The reference to the variable Q% in lines 90 and 110 should be changed to q (ie a real variable rather than an integer one). Apologies also to author David Johnson-Davies whose original listing was correct – the technical editor is to be shot at dawn (twice).

● Mr Crenell of Didcot was quick to spot that we omitted listing 1 from the Mandelbrot article. So here it is:

```
10 REM Turbulence
20 REM by David Johnson-Davies
30 REM for BBC B/B+/M/E
40 REM (c) Acorn User June 1986
50 :
60 MODE 2
70 S%=255
80 line%=5:point%=69
90 VDU 28,16,31,19,0
100 INPUT "x,s:" j,q
110 Q%=1024:M%=256
120 i=q/M%:I%=Q%/M%
130 style%=point%
140 FOR J%=0 TO M%-1
150 PROCplot
160 style%=line%
170 NEXT
180 END
190 :
200 DEF FNt(u)
210 N%=-1:x=0
220 REPEAT x=x-x*x+u:N%=N%+1
230 UNTIL N%=S% OR ABS(x)>100
240 =N%
250 :
260 DEF PROCplot
270 x=j+i*J%:Y%=FNt(x)*I%
280 X%=J%*I%:PLOT style%,X%,Y%
290 ENDPROC
```

● Finally, we have to admit a blunder going back to the September 1985 issue of *Acorn User*. On that month's cassette we carried an enchanced version of George Hill's *View* printer-driver generator. This version, by Dr A A Hock of Leeds requires the following amendments to function correctly:

```
 980 .norm_ht  AND #mask1
1121           AND #mask2
1125           LDA #cnt%
```

In other words, the # symbol had been omitted from these lines. We apologise to Dr Hock also for not using his corrected listing.

ME & MY MICRO

Our series about people and their micros

Sir George Young

Junior Environment Minister Sir George Young little thought a Christmas present for his daughter could change his life – and his entire banking habits. But that was before he discovered the potential of a BBC micro.

In two years it has turned him into one of the most computer-conscious MPs in Parliament – illustrating the value of a Beeb even to someone who admits he has scarcely any knowledge of what makes it work.

Sir George, an Eton-educated baronet and one-time trade unionist, is more concerned with what a computer will do than how or why it does it.



PHOTOGRAPH BY CHRISTOPHER CORMACK

Not that he considered the practical purposes of his Beeb when he first brought it home for eight-year-old Camila two years ago. 'Originally it was simply a present for my children to play games on,' he explained.

'I bought a BBC micro as this was the machine they had at school. But my son Gerry, now at Oxford, had already got his GCE 'O' level in computing and he became interested in programming. It wasn't long before I started to look at what the kids were doing and I began to have a go as well.

'Soon I was slogging my way through the user's handbook. After that we began to get the magazines specialising in the Beeb – and it was then it came home to me just what the machine could do.

'The first thing I did was to get myself *Wordwise* for wordprocessing. Then I went out and bought a printer, a daisywheel called a Sanple. So I began using it for correspondence, putting my headings for letters on disc and found it to be jolly useful.

'After that I began to get other ROMs. One to transfer cassette programs onto disc, which is handy. Then I went in for a spreadsheet. It's proved very helpful for budgetting. My wife runs a small business and I put all the finances on it and it is quite helpful for VAT and accounts and that sort of thing. I have also bought some accounting programs. Cash books, invoices, etc, for the business.

'One very useful program I bought was from *Which?* magazine called *Taxcalc*. You feed in your income, allowances and various totals, etc, and it works out what your tax ought to be so you can check it against what the Inland Revenue has actually done for you.

'I've got rid of my accountant. He was charging me £800 a year and this program cost five quid. It paid for the machine in a year.'

But it is not simply for straightforward wordprocessing, book-keeping and budgetting that Sir George finds the Beeb so useful. The real bonus for him is the opening up of micro communications via his modem and teletext adaptor.

A subscriber to both Telecom Gold and Prestel, the junior minister is less than complimentary about the former which he reckons is both expensive and of little value to him. But Prestel and teletext are a different story.

'The kids and I use them mainly as information sources. For instance with teletext if I get home late at night and want to know what the news is I simply turn on my adaptor and summon up Oracle or Ceefax. My kids use it for what's on in London and jokes.'

Getting home late is one of the particular banes of Sir George's life. As a junior minister he regularly has to answer for the Government at the end of one of the short 'adjournment debates' which wind up every Parliamentary day . . . frequently in the wee small hours.

The services of Prestel have proved even more useful than teletext. For as well as joining Micronet, Sir George has linked-up to Homelink, the home banking and finance service run by the Bank of Scotland and Nottingham Building Society.

Sir George is unashamedly enthusiastic about Homelink. 'It's particularly useful for controlling your cash flow. In fact it's a lot better than normal clearing banks,' he claims. 'I can see when money has come in, when my cheques have been presented and can time the payment of my own bills accordingly. I have quite a lot of tenants who pay me by banker's order. Now from home I can see when their money has arrived in my bank account.'

So all-in-all the Beeb has proved a real bonus, but he admits there have been problems – especially trying to fathom out the handbook. 'It's a bit daunting for most beginners, particularly when it is originally intended for a young daughter. It is not very well presented and it would help to have it segregated into sections. It quickly goes from fairly basic information to the extremely sophisticated. Without my son Gerry's help I think I would have been a bit put off.'

Now, however, he reckons he's 'hooked' on the Beeb or its successors – not least because he can't face the prospect of having to re-learn an entirely new and different machine.

But what ever happened to those games for which he originally bought the Beeb in the first place? Ah, well! Sir George insists that while he may lack a certain expertise in programming he has at least become a dab-hand in one field – 'I got up to 160,000 on *Mr E* zapping apples. I thought that was pretty good!'

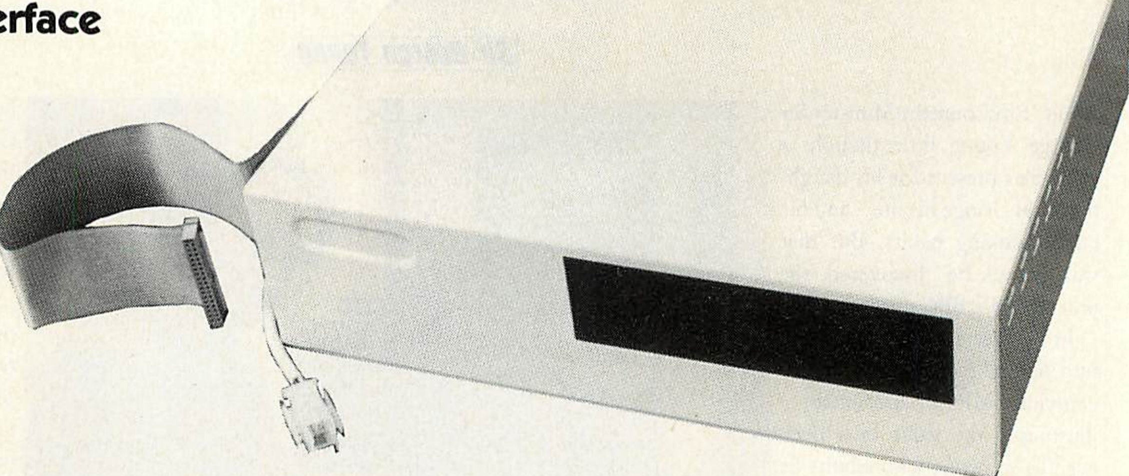
Sir George Young was talking to Bill Penfold

Disc Interfaces and Wi

Solidisk offers well designed Disc Interfaces enabling your computer to use floppy disc drives. If you feel you would have any difficulty in installing it and/or adding disc drives, you can contact one of our 90+ Local Experts who will install it for you free of charge.

The 1770 Disc Interface

The Solidisk 1770 Double Density Disc Interface has only four components and can easily be fitted even by a novice. The 1770 Disc Interface is supplied with Solidisk 2.2 DFS ROM.



The Solidisk 1770+8271 Disc Interface

If you already have a 8271 Disc Interface, then the Solidisk 1770+8271 Interface will give you the best of both worlds. You can select either the 8271 or the 1770 at a flick of a switch. The 1770+8271 Interface is supplied with the Solidisk DFS+ADFS ROM set. This is available in two 16K or one 32K ROM.

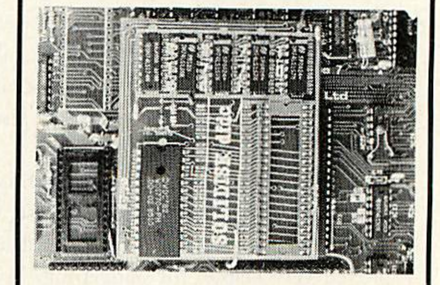
Features built into ROM	DFS 2.2	ADFS
Disc formatter	yes	yes
Disc verifier	yes	yes
Memory editor	yes	yes
Disc sector editor	yes	yes
Disc copier	yes	yes
Recover & Restore	yes	yes
Read track & Write track	yes	yes
Run 8271 floppy disc controller	yes	no
Osword 7F emulator for 1770	yes	yes
Tape to disc	yes	yes
Download	yes	yes
DFS files to ADFS	no	yes
ADFS files to DFS	no	yes
40/80 switching for 80-track drives	yes	only in DFS
Solidisk Winchester	no	yes
6502, Z80 and 32016 compatible	yes	yes
Read & Write IBM-PC DOS discs	yes	yes

Both the DFS and ADFS have every facility that you would expect. They can run most protected software, such as Elite, Castle Quest, Island Logic's Music System etc. Other features include read after write, and the option of double density operation (with the 1770 chip) giving 60% extra storage capacity. Their compatibility with all Acorn Second Processors (6502, Z80 and 32016) and Econet File Server (Level 2), and their capability of reading from and writing to IBM-PC DOS diskettes (with the 1770 chip) reflect the broad range of applications supported. Both 1770 and 1770+8271 Disc Interfaces are compatible with Acorn 1770 DNFS and ADFS ROMs.

The DFS and ADFS ROMs can be used to enhance both standard Acorn 8271 or 1770 Disc Interfaces, on the BBC Model B or the B Plus.

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00



Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

chesters from Solidisk

The Solidisk Winchesters are now available for the BBC Model B, B Plus and the new Master Series machines. They are supplied with the Solidisk DFS+ADFS ROM set, available in two 16K or one 32K ROM.

WINCHESTER FOR SINGLE USERS

The Solidisk ADFS can handle one or two Winchester drives plus one or two floppy disc drives. Files on any drive can be up to the drive size in length. Up to 10 files can be open at the same time and unlimited numbers can be organised in a multi-level catalogue. Files can grow in place without risk of "Can't extend".

The ADFS allows the Winchester to be "partitioned" into multiple user areas, accessed by CP/M (Z80), Panos (32016) as well as 6502 ADFS. The Acorn Z80 Second Processor as supplied requires a new BIOS ROM to run CP/M.

WINCHESTERS FOR SMALL NETWORKS

Solidisk will soon introduce the NET-DISC Filing System (NDFS). This, although using the standard ECONET hardware, implements a direct link between any workstation and the Winchester disc drive on station 254. No dedicated file server machine (nor any Second Processor to run the File Server software) is needed.

The NDFS will also be suitable to network 32016 and Z80 Second Processors. The cost saving is substantial, especially for small networks. For example, four workstations sharing one Winchester via such a network is cheaper than four stand-alone machines equipped with local floppy disc drives.

WINCHESTERS FOR LEVEL 2 FILE SERVERS

The Solidisk Winchester Disc Filing System (WDFS) ROM enables the Acorn File Server (Level 2) to use the Winchester in place of floppy disc drives. This will improve both speed and capacity. The WDFS will work with either the 8271 or the 1770 Disc Interfaces.

HIGHER CAPACITY, RELIABILITY AND SPEED

The Winchester drives have much higher capacity than floppy discs, measured in Megabytes instead of Kilobytes. The disc is protected from dirt by a sealed casing, and has a much higher inherent reliability. The disc rotates continuously at high speed (3600rpm) enabling data to be transferred 20 times as fast as floppy discs.

HARDWARE REQUIREMENTS

To use a Solidisk Winchester, you will need a 1770 Disc Interface (Acorn or Solidisk). Master and BBC B Plus machines have this as standard. If your BBC B has no disc interface, we recommend the Solidisk 1770 Disc Interface. If you already have the 8271 Disc interface, we recommend the Solidisk 8271+1770 Disc Interface. The Winchester drive is connected to the 1MHz bus socket.

5.25 inch WINCHESTERS

These drives (10, 20 and 40 Megabytes formatted) are of established design, with low noise and power consumption and have the same "form factor" as a half-height floppy drive.

3.5 inch WINCHESTERS

These are of the latest technology, with even lower noise and power consumption in a smaller package, and have the same "form factor" as a 3.5 inch floppy drive.

BEEB-POWERED OR MAINS-POWERED

The Beeb-powered Winchesters are only suitable for use with machines fitted with the shiny, switched mode power supply and all Master series. The Winchester power lead will also support a floppy disc drive. In other cases, a mains-powered Winchester should be specified.

THE SOLIDISK WINCHESTER RANGE

Each Winchester drive comes with:

— Integral power and data leads.
— DFS (or WDFS on request) and ADFS ROM set.
— One utility diskette in 5.25 inch, 80-track double-sided ADFS format.
— Manuals covering the above hardware and software.
— One year guarantee.

The Solidisk Winchesters are available in the following packages:

	BEEB-POWERED	MAINS-POWERED
10 Megabytes 5.25 inch	**£499.00**	**Not available**
20 Megabytes 3.5 inch	**£720.00**	**Not available**
20 Megabytes 5.25 inch	**£661.25**	**£747.50**
40 Megabytes 5.25 inch	**£1062.60**	**£1148.85**

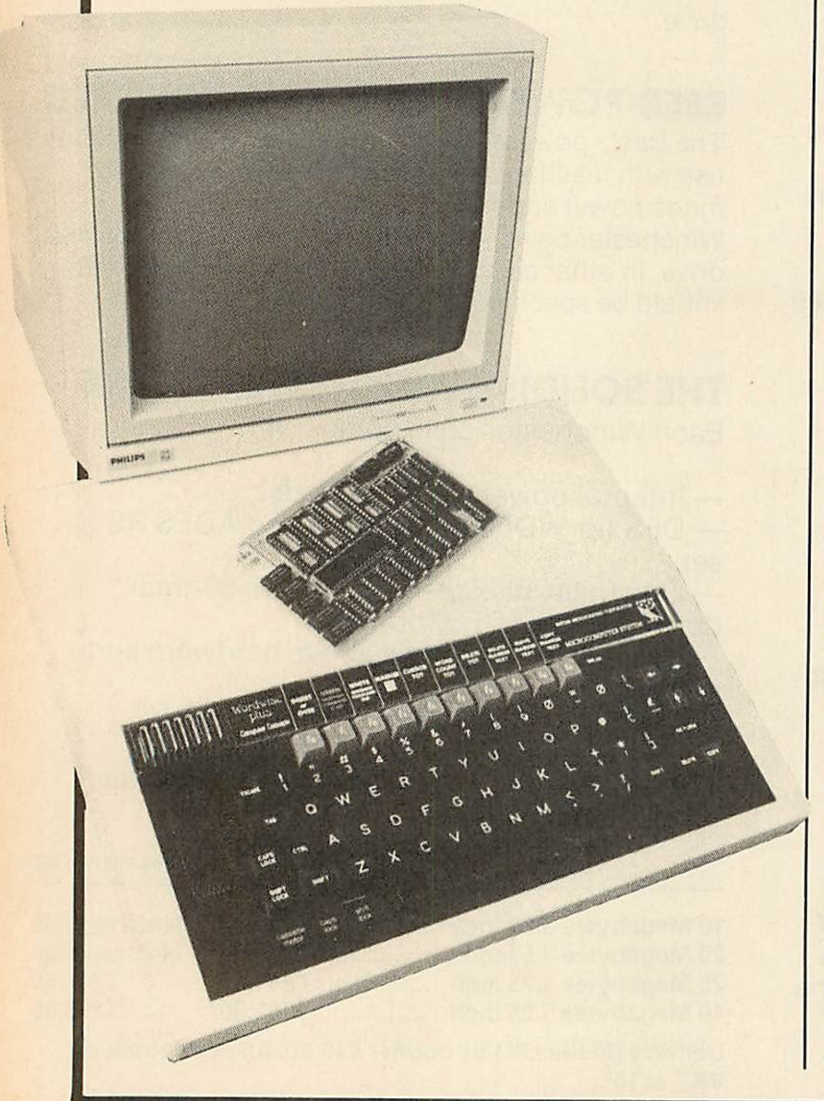
Delivery (in the UK) by courier £10.00. All prices include VAT at 15%.

SOLIDISK MEMORY UPGRADES

Solidisk memory upgrades for the BBC Model B offer excellent value for money. Their designs stand our for compatibility, speed, versatility and computing power. They use the latest component technology to achieve the lowest possible power consumption and size at low cost.

External ROM Cartridge

This comprises an adaptor which plugs into any ROM socket, and a blank cartridge which will accept one or two ROMs. These may be of 16K, 32K or 64K, depending on the capacity of the ROM socket holding the adaptor. This system is particularly useful for seldomly used ROMs, which are well protected by the cartridges. They can be installed and removed repeatedly without any risk to the ROMs and are compatible with Acorn cartridges.



Fourmeg CPU and ROM Expansion

The Fourmeg board plugs into the 6502 Processor socket, and two additional connections are made by sprung clips. It also provides one 64K and three 32K additional ROM sockets.

By adding faster memory and a 4MHz Processor, this board enables the BBC to run most programs in half the time. The new Processor is equivalent to that used on the Acorn TURBO board. It will run most Master software such as the new BASIC 4 and at twice the speed.
A switch selects between normal (2MHz) and fast (4MHz) speed. The higher speed is available to all ROMs and RAM installed in the Fourmeg board. The rest of the machine is unaffected.

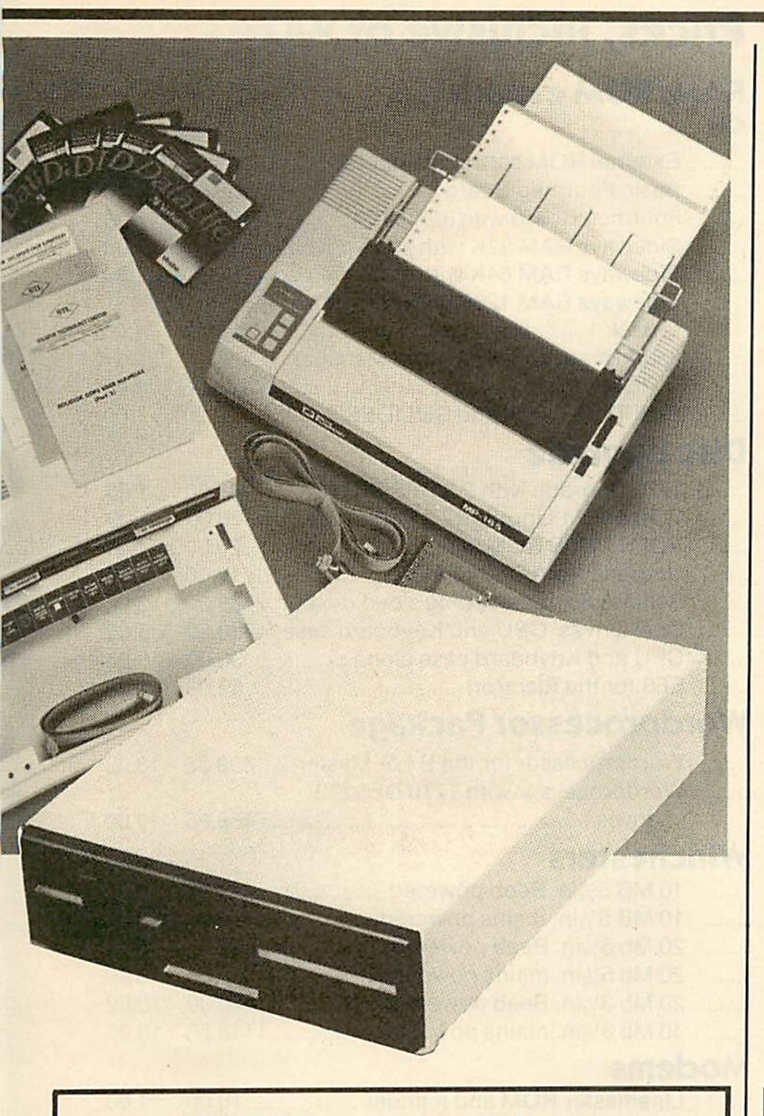
Fourmeg Board with 32K RAM

This comprises a Fourmeg board with 32K RAM and a 16K MANAGER ROM. This extra RAM gives Shadow RAM and Sideways RAM capability. Shadow RAM supports the screen in any mode, leaving all the machine RAM free. Sideways RAM can contain the images of two Sideways ROMs or used as RAMDISK or printer buffer. Shadow and Sideways RAM, and the four additional ROM sockets can be switched to the fast 4MHz speed.

32K, 64K and 128K Sideways RAMS

These are the most popular add-ons for the BBC Model B. You can start with 32K and upgrade later to 64K, 128K (and even 256K). The 64K and 128K RAM boards have two 32K additional ROM sockets.

Solidisk Sideways RAM boards are compatible with most add-ons except ROM boards — which they replace. Sideways RAM can run almost all software that is normally available in ROM. Solidisk has a large library of application programs. These include Word-processor, Spelling Checker, Database, Spreadsheet, Extended Basic, Sprites, Ramdisc, Printed Buffer, Machine Code Monitor etc. and more than 70 computer games especially written for Sideways RAM. The programs are available in three packs, each of 5 discs, in 40 or 80-track formats. Pack 1 is included with all Sideways RAM board. Packs 2 and 3 cost £10.00 each (£1.00 p&p). Pack 3 consists entirely of games and game design tools.



The 256K Board

This has 256K of RAM, four ROM sockets, a 4MHz Processor, a 32K Manager ROM, together with WORDWISE PLUS — the best selling Wordprocessor from Computer Concepts.

The 256K RAM can be used as Shadow RAM, Sideways RAM and RAMDISK, or any combination of the three.

Real Time Clock and Solidesk

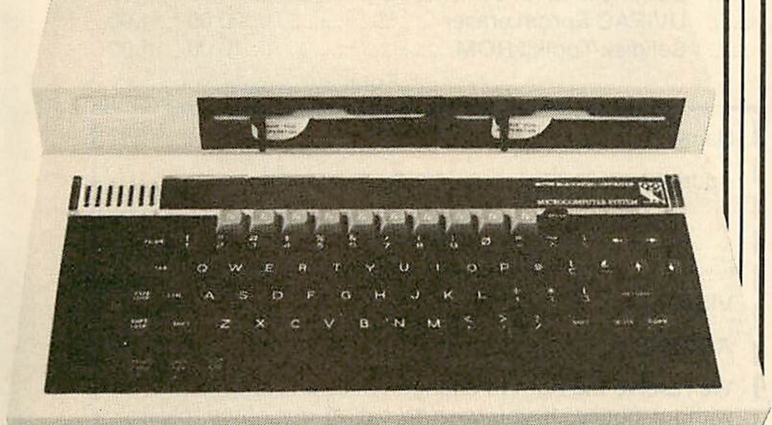
The Real Time Clock (RTC) is battery powered, giving accurate time and date. The "SOLIDESK" ROM uses the 50 bytes of battery backed RAM in the RTC chip to custom-configure the BBC computer on start-up — just like the new Master Machine. It also presents a friendly ICON/MOUSE environment — with calculator, memo and a number of disc operating system commands (DFS and ADFS). An AMX Mouse or a Marconi Tracker Ball is preferred as the input device, but the keyboard may also be used.

Floppy Disc Drives

Solidisk floppy disc drives are 80-track, double-sided, 5.25 inch, with a capacity of 640K in ADFS or Solidisk double density DFS. They are Beeb-powered, supplied cased, with power and data leads, and a software pack of 5 diskettes.

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This compact steel case can hold a BBC and two 5.25 inch half-height floppy disc drives. The keyboard is housed in a separate case connected by a 24 inch lead. With the monitor on top, it improves your viewing angle and leaves your desk uncluttered.



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The Linemaster ROM

The Solidisk Linemaster ROM allows the BBC micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

Telecom Gold

Telecom Gold is the British Telecom electronic Mail Service enabling computer users to send and receive messages, telexes and to access many large databases. The Linemaster ROM allows you to use the BBC computer to communicate with Telecom Gold and Bulletin Boards. Its features include various baud rates and protocols, an elapsed time clock and 40/80 column screen display.

Prestel

Prestel i the British Telecom Viewdata service. The Linemaster ROM offers extensive facilities to communicate with Prestel. If you have an autodialling Modem, a simple command such as *PRESTEL 618 (for London) can put you "online" with the local Prestel computer.

Viewdata Host

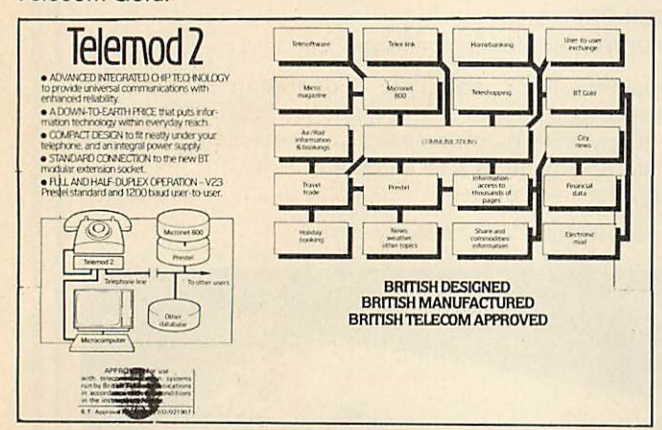
In this mode, your BBC is set up as 'Prestel look alike'. Other users can communicate with your computer exactly as with Prestel. They can browse through pages that you create using Linemaster.

Modems

The Linemaster ROM works well with all RS423 type modems, eg Telemod, Nightingale, Miracle etc. but not all modems support all the features of the Linemaster.

Telemod 2 Modem

The Telemod 2 is a high quality, mains powered, BABT approved MODEM for direct connect. This means that there are no rubber cups to fit the telephone into, but just a connection to a modern socket, with the telephone plugging into the back of the modem. The modem supports 1200/75 baud (V23) communications protocol as in Prestel and Telecom Gold.



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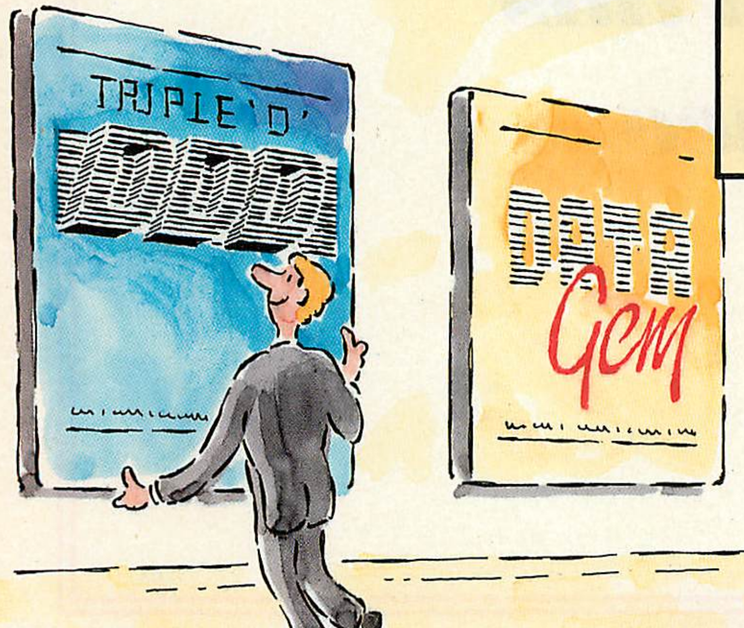
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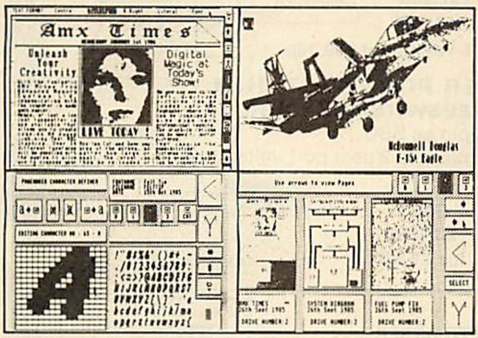
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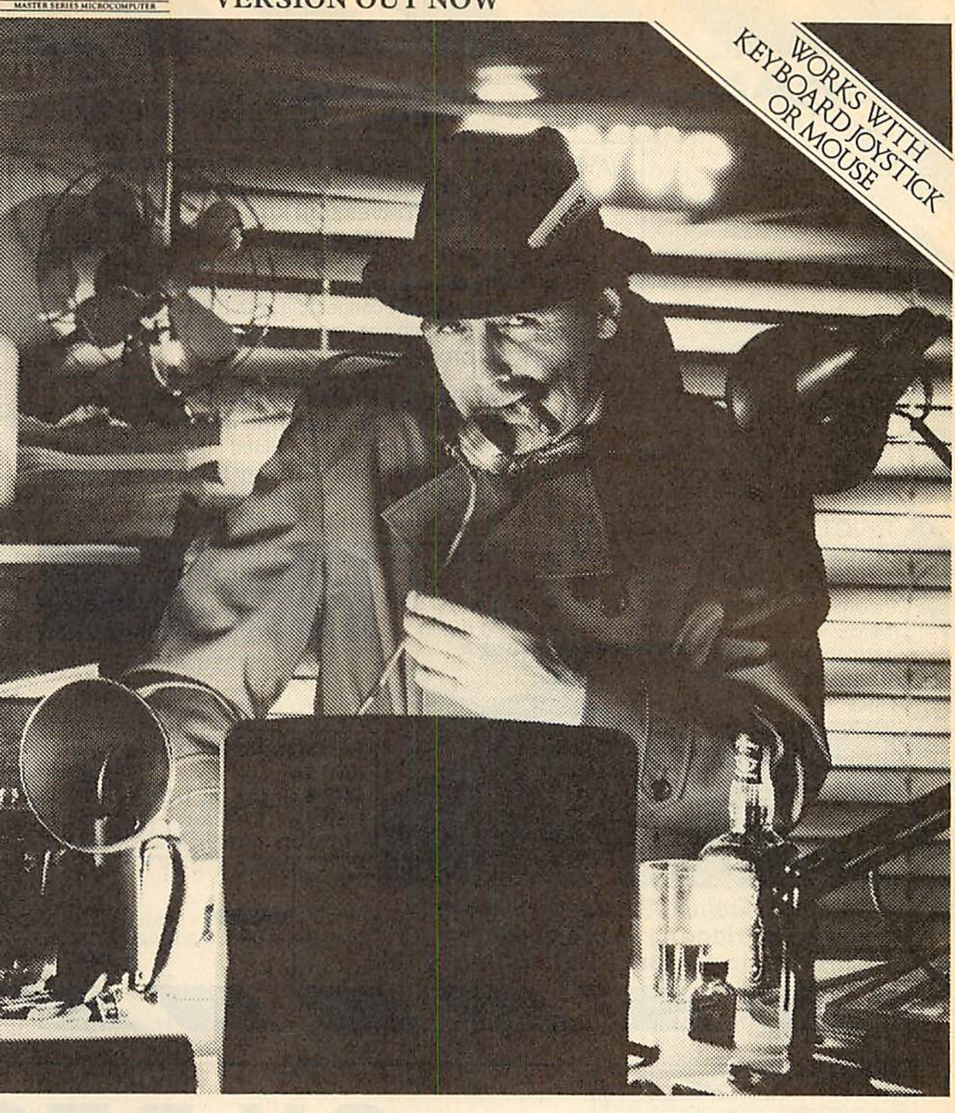
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TECHNOMATIC

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ACORN 32016 CO-PROCESSOR

Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing acces to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

32016 CO PROCESSOR (Currently available from stock) £1130 (a)

Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.

WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III is installed as standard on Acorn Winchesters. Non Acorn drives are fully compatible with the Acorn ADFS system and Torch Z80 system and offer a good value for money.

Acorn 10 Mbyte Winchester £1100 (a)
Acorn 30 Mbyte Winchester Drive £1630 (a)
5 Mbyte Hard Disc £600 (a)
20 Mbyte Hard Disc £1025 (a)

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EPROMs/RAMS

2764-25.........£2.00 (d) 27128-25.........£2.50 (d)
6264LP-15........£3.40 (d)

ACORN 2nd PROCESSORS

Acorn Z80 2nd Processor: Z80 CPU with 64K of RAM housed in a separate case with a integral power supply interfaces with the BBC computer through the TUBE. It converts the BBC into a CP/M system and its comprehensive package of software provides a suitable basis to set up a business system. £329 (a)

Acorn 6502 2nd Processor: This processor provides faster data processing speeds and larger memory. Particularly useful for use with Hi View word processor for production of large documents. £162 (b)

MULTIFORM Z80 2nd PROCESSOR

This processor converts your BBC into a power CP/M system and make it capable of operating in almost any CP/M format. Full details on page 5. £299 (b)

TORCH Z80 2nd PROCESSOR

ZEP100: This Z80 processor with 64K fits internally in the BBC computer and has the operating system in a ROM. It is supplied with the PERFECT suite of software comprising of a database, wordprocessor and a spreadsheet and a BBC BASIC for Z80. £229 (a)

TZDP240: ZEP100 with TECHNOMATIC PD800P dual drive with built in monitor stand. £469 (a)

ACORN TELETEXT ADAPTOR

This adaptor will convert the BBC computer into a teletext receiver capable of decoding and displaying the CEEFAX and ORACLE pages and the monitor screen. These pages can also be saved for later reference. BBC TV transmit educational software on their CEEFAX system which can be downloaded free of charge. £125 (b)

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £278 (a)

ROBOCOM BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 192 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

ROBOCOM BITSTICK I £299 (a)

ROBOCOM BITSTICK II: This package is as Bitstick I with software upgraded to allow scaling and auto dimensioning. Multiplotter driver is also supplied with the package. £775 (d)

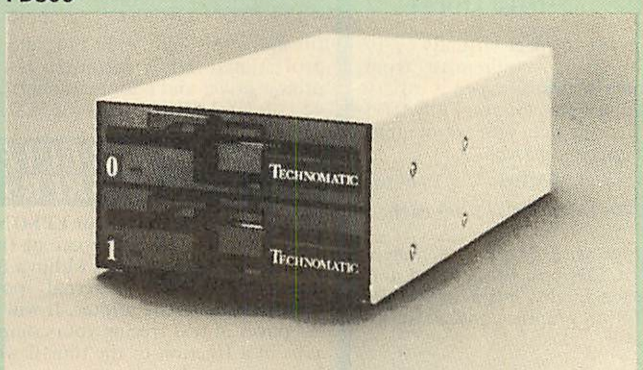
Upgrade for Bitstick I to II £415 (b)
Bitstick Multiplotter Driver (most popular plotters included) £69 (b)
Epson FX80 Screen dump routine for Bitstick I £35 (d)
Epson FX80 dump for Bitstick II £39 (d)

DISC DRIVES

All drives listed below are fully compatible with single and double density DFSs. The larger capacity referred to below is for the Acorn's ADFS system.



PD800



Your computer installation can look like this with our PD800P drive

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

Fully compatible with the DFS and ADFS filing systems on the new MASTER's range.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, and a mains lead with a suitably fused 13A moulded plug.

PD800P 2×400K/2×640K 40/80T DS **£269 (a)**

TECHNOMATIC's stacked drives are housed in smart metal casings painted in BBC beige colour and are built to the same exacting standards as PD800P drives. The drives are fitted with integral switch mode power supply and supplied with a mains lead with a suitably fused 13A moulded plug and a data lead.

These drives are fitted with the new model MITSUBISHI mechanisms, which have been specially adapted for us to fit the 40/80 track switches on the front panel of the mechanisms. This would mean that the user no longer needs to grope at the rear of the drive to set the correct track setting.

PD800 (2 × 400K/2 × 640K 40/80T DS) **£249 (a)**

TD800 (as PD800 but without the psu) **£225 (a)**

TECHNOMATIC's single drives are also housed in metal casings painted in BBC beige colour and are offered with or without power supply. All drives are supplied with data cables and suitable power leads. Mains powered drives have a lead suitably fused with a 13A moulded plug.

1 × 400K/1 × 640K 40/80T DS

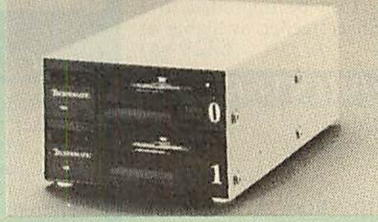
TS400 £109 (b) **PS400** with psu **£129 (b)**

3.5" DRIVES

These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives are offered with or without integral mains power supply and they are supplied with all the necessary cables to make them ready for connection to a computer. Mains powered drives are supplied with a lead with suitably fused 13A moulded plug.

1 × 400K/1 × 640K 80T DS : **TS35 1 £109 (b)**; **PS35 1** with psu **£124 (b)**

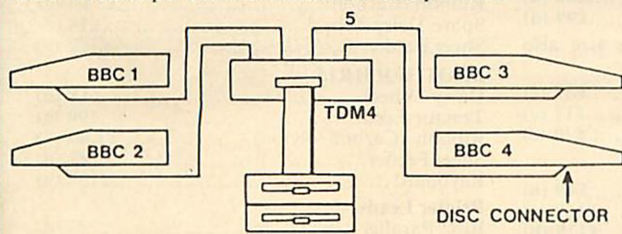
2 × 400K/1 × 640K 80T DS : **TD35 2 £199 (b)**; **PD35 2** with psu **£219 (b)**



TD35 2

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers) **£135 (a)**

TDM2 Dual Unit (2 computers) **£75 (b)**

DISC STORAGE BOXES

NON LOCKABLE		**DB530** 30 × 5¼"	**£6.00 (c)**
LOCKABLE		**DB340** 40 × 3½"	**£8.50 (c)**
DB550 50 × 5¼"	**£9.50**	**DB570** 70 × 5¼"	**£11.00 (c)**
DB5100 100 × 5¼"	**£13.00 6b)**		

3M 5¼" FLOPPY DISCS

40 T SS DD	£10.50
40 T DS DD	£12.75
80 T SS DD	£14.75
80 T DS DD	£16.00

(£1 extra for library case packing)



3M 3½" FLOPPY DISCS

80 T SS DD **£18 (d)** 40 T DS DD **£25 (d)**

Discs in packs of ten

Available at the new greatly reduced prices (for limited period only)

SPECIAL BULK DEAL

High quality **5.25"** with our usual lifetime warranty. The discs are packaged in a lockable plastic box.

50 Single Sided 40 track Double Density	£42.50 (b)
50 Double Sided 40 track Double Density	£55.00 (b)
50 Double Sided 80 track Double Density	£65.00 (b)

DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. 5¼" £14.50 (d)

Floppiclene with 20 disposable cleaning kits. 3½" £16.00 (d)

TECHNOMATIC

01-208 1177

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London NW10 1ED
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(b) £2.50
(c) £1.50
(d) £1.00

EPSON PRINTERS

LX80 a low cost high performance printer with NLQ and a variety of other fonts and graphic modes. 100cps. Friction feed as standard.

LX80 £195 (a) **Tractor Feed £20 (c)**

FX Range: A new range to meet virtually every type of computer printing requirement from correspondence quality text printing to a variety of fonts, to 7 different graphic modes. Fully IBM compatible. 8K buffer for data storage or upto 240 user defined characters. 160cps.

FX85 £315 (a) **FX105 £449 (a)**

A limited no of FX80s available at £260 each.

LQ Range: This range with 24 pin dot matrix printers offers a high, 200 cps, draft speed and superb correspondence quality print at 67 cps and truly high resolution graphics and a variety of fonts.

LQ800 £495 (a) **LQ1000 £729 (a)**
LQ1500 (2K) £875 (a) **LQ1500 (32K) £950 (a)**

TAXAN PRINTERS

A set of economically priced printers that offers full EPSON compatibility and the near letter quality option and a facility to install 8K additional ram or 8K eprom for custom font. Both friction and tractor feeds as standard. 140 cps draft and 24 cps NLQ. A variety of fonts and graphics in six densities.

KP810 (80 col).................... **£220 (a)**
KP910 (156 col).................. **£379 (a)**

NEW JUKI 5510 PRINTER

A new dot matrix printer from the reliable JUKI stable. Features include a fast 180 cps. NLQ at 40 cps. Full EPSON/IBM compatibility. 3K buffer as standard expandable to 15K. Full graphics capability and a variety of fonts including international characters set. Can be upgraded to a seven colour printer. Sheet feeder available as optional extra. **£229 (a)**

COLOUR PRINTERS

EPSON JX80 4 colour. **£420 (a)**
Integrex Colour Jet Printer. **£549 (a)**
Canon PJ1080A **£369 (a)**
JUKI 5510 colour upgrade. **£99 (b)**

CENTRONICS GLP

A NLQ printer at an affordable price. Fully compatible with Epson control codes offering a variety of fonts including super and subscripts, and a variety of graphic modes. Serial and parallel interfaces fitted as standard. Friction feed as standard. **£109 (b)** Tractor feed **£14 (d)**

DAISY WHEEL PRINTERS

BROTHER HR15: * 14 cps * 3 K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 **£285 (a)**

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for maximum reliability.

JUKI 6100 **£289 (a)**

DOTPRINT PLUS

The most versatile NLQ rom for the BBC Micro. DOT PRINT PLUS not only gives you the 10 character pitch at 6 lines/in with underlined and double width characters as required but unlike all other NLQ roms, it offers a lot more.

* a built in CHARACTER FONT EDITOR enables disc users to create their own type faces for using in printing spooled text files.
* a built in View Printer Driver.
* MICROSPACING for professional justification in VIEW and — with discs — in WORDWISE/PLUS.
* true BOLD PRINT in addition to double width.
* 12 char pitch as standard — providing 96 CHARACTERS PER LINE on the FX/RX 80 for example.
* simple control codes allow VARIABLE PITCH LINE SPACING in 1/72" increments and VARIABLE PITCH from 12 cpi in increments of 1/240". (10 cpi can be selected by a single control code).

Suitable for use with printers fully compatible with EPSON quad density graphics.

In short this one rom not only will provide professional NLQ facilities, but also a vew printer driver and a font designer/editor for onlv **£28 (d)** **DOTPRINT** Dual for MX Range. **£28 (d)**

PRINTER BUFFER & SHARERS

BUFFALO 32K Buffer for EPSON PRINTERS: This compact 32K buffer can be fitted internally on most EPSON printers within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.

Buffalo 32K Buffer **£75 (d)**

PRINTER SHARER/BUFFER: A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

Available in 64K and 256K versions

TSB 64 £199 (b) **TSB 256 £275 (b)**

A Serial Buffer/Sharer will soon be available. Please send for details.

PERIPHERAL & COMPUTER SHARERS

An extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69(c)	25V25-3 £64 (c)
4 Computers to a Printer	36V36-4 £85 (c)	25V25-4 £74 (c)
2 Computers/2 Printers x-over	36V36-X £69 (c)	25V25-X £69 (c)
BBC Cable Set 3 to 1 (1m ea).	£32 (c)	£34 (c)
BBC Cable Set 4 to 1 (1m ea.)	£39 (c)	£41 (c)

BBC Computer Sharer: TCS26:
1 computer to 2 printers fitted with Cable. **£19.50 (c)**

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, eclipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer.

Detailed leaflet on request.

Epson HI-80 Plotter **£325 (a)**

HITACHI 672 PLOTTER

A high speed, compact A3 plotter with 4 colours and high accuracy. Both serial and parallel ports as std. Plots on either OHP film or plain paper. Operates on HP GL or single character commands and is easy to interface to most graphics software. **£465 (a)**

GRAPHICS PLOTTER

Available again with considerable enhancements to the original model. Plotting area has been increased to A3 size with a resolution of 0.1mm. Opto sensor converts the plotter into an input device to scan and digitise pictures, traverse mazes and investigate methods of artificial intelligence. A more powerful drill/router attachment and scriber provide facilities for drilling on various materials and fine line drawing on coated materials.
Total cost: **£629 (a)**

Basic plotter and accessories available separately. Send for details.

PLOTMATE

From Linear Graphics a fast, accurate and easy to use plotter.

The A4 Plotmate is the ideal drawing companion for all BBC micros, the Master and Cambridge Work Station. Plugs into the user port or printer port of your BBC Micro and directly driven by the BBC graphics commands in BBC Basic, Logo or indeed any high level language without additional driver software.

Plots onto paper, card or acetate film in up to 6 colours using fibre, OHT or ballpoint pens.

A4 Plotmate £299 (a)

PRINTER ACCESSORIES

EPSON ACCESSORIES:
Interfaces:
8143 RS232........ **£28 (d)**
8148 + RS232 + 8K........ **£75 (d)**
8165 IEEE + Cable........ **£65 (d)**
8148 RS232 + 2K........ **£57 (d)**
8132 Apple II........ **£60 (d)**
8177P NLQ for FX80 + /FX100 +........ **£99 (d)**

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment........ **£37 (c)**
FX80/80 + Paper Roll Holder........ **£17 (c)**
LX80 Tractor Feed........ **£20 (c)**

SHEET FEEDERS:
8338 LX80........ **£49 (b)**
8333 FX100 + /105........ **£169 (a)**
8331 FX80 + /85........ **£129 (b)**
8330 RX80 +........ **£129 (b)**

Ribbons:
RX/FX100/100 +, FX105........ **£10 (d)**
RX/FX80/80 +, FX85........ **£5 (d)**
LX80........ **£4.50 (d)**
H180 Pen Set (Aqueous/Ball point)..... **£7.50 (d)**

Dust Covers:
FX80........ **£5.50 (d)**
TAXAN/Canon KP810........ **£6 (d)**
FX100........ **£7.50 (d)** **KP910**........ **£7 (d)**

TAXAN CANON Accessories:
RS232 + 2K buffer........ **£78 (d)**
Ribbon........ **£6 (d)**

JUKI 6100
RS232 Interfaces........ **£65 (d)**
Tractor Feed........ **£129 (a)**
Ribbon (Carbon)........ **£2.00 (d)**
Spare Daisy Wheel........ **£14 (d)**
Sheet Feeder........ **£182 (a)**

BROTHER HR15
Daisy Wheel........ **£18 (d)**
Tractor Feed........ **£90 (a)**
Ribbon (Carbon/Nylon)........ **£3.00 (d)**
Sheet Feeder........ **£182 (d)**
Keyboard........ **£135 (a)**

Printer Leads:
BBC Parallel Lead (1.2m)........ **£6 (d)**
BBC Serial Lead (1.2m)........ **£6 (d)**

Other lengths can be supplied on order:
IBM Parallel Lead (2m)........ **£12 (d)**

PAPER & LABELS
Plain Fanfold paper with micro perforations:
2000 sheets 9½" × 11"........ **£13 (b)**
2000 sheets 14½" × 11"........ **£18.50 (£4.50)**

Labels/1000:
Single Row 3½ × 1 7/16"........ **£5.25 (d)**
Triple Row 27/16" × 17/16"........ **£5 (d)**

MULTIFORM Z80

The MULTIFORM Z80 2nd Processor for the BBC Micro — opens the horizons of CP/M software to the BBC micro user

* Will enable running of almost any CP/M applications software
* Will enable transfer of data between different disc formats
* Emulates the two terminals most frequently used by CP/M software

MULTIFORM Z80 interfaces directly to a normal BBC micro requiring no hardware changes. It is supplied with OS/M operating system in rom which can run all software that obeys CP/M 2.2 constraints and its configuration is not hardware specific.

MULTIFORM Z80 is truly flexible and can be used with any BBC micro drive system, single or dual drive, 40 or 80 track format and single or double sided. Unlike other currently available Z80 processors for the BBC micro, there are absolutely no restrictions on the type of drive that can be used with the MULTIFORM Z80.

MULTIFORM Z80 plugs into the 1MHz bus connector of the BBC micro. It is mains powered and does not put any extra load on the BBC's psu. The data cable can be several feet in length, allowing convenient siting of the MULTIFORM Z80, unlike present second processors, which have 8" cables.

Twenty eight CP/M formats are supplied which include: Acorn Z80, RML 380Z and 480Z, Torch (read only), Osborne, Televideo . . . we also offer to configure other formats at an extra charge."

Rom based OS/M operating system is fully compatible with Acorn's single and double density disc interfaces. Installing the OS in rom allows more space on discs for programs and data and response to system commands is very fast. (Note: Single density DFS will only read/write to single density CP/M formats).

MULTIFORM Z80 can format, read or write from a very wide range of CP/M disc formats. On a dual drive system, the drives can be set up independently to run two different formats at the same time. This will enable:

* The user to buy software from a very wide range of suppliers without having to worry about the type of format supplied.
* Interchange of valuable data and files among users of various CP/M computers.
* Using a system at home for preparing data required in the office.
* Software writers/developers to write software in any one format and transfer it to any other format without having to pay for expensive porting charges.

MULTIFORM Z80 is supplied with a library of a number of popular CP/M formats and a utility disc containing a program for creating files for the additional formats. Each library can load 32 formats and there are no restrictions on the number of librarires that can be created.

The utility disc also contains a program to interconvert ASCII texts wordprocessed on a normal BBC and under OS/M or CP/M.

MULTIFORM Z80's terminal emulation includes the ADM-3A, the HAZELTINE 1500 and the BBC VDU making the installation of most of the well known CP/M software easy.

MULTIFORM Z80 converts your BBC computer into an almost universal CP/M machine and adds the power of being able to run two different formats simultaneously, which currently is possile on only the very sophisticated specialist machines.

For any one working or intending to work in a CP/M environment, MULTIFORM Z80 is an indispensable tool.

In offices where there are a multitude of CP/M machines and a few BBCs, MULTIFORM Z80 will prove to be invaluable for transferring data between the various CP/M machines.

MULTIFORM Z80 (including utility disc, library disc and manual) **£299 + £4 p&p**

(When ordering please specify the type of DFS, MULTIFORM Z80 will be used with)

SPECIAL MULTIFORM UTILITY to read and write to IBM PC Disc. **£75 (d)**

CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. Phone for details on prices for popular packages for IBM

Please phone for our new professional software catalogue

WORDSTAR PROFESSIONAL The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive friendly manual, step-by-step training guide, command cards, on-screen menus. Spellstar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering etc.

WORDSTAR PROFESSIONAL £310 (a)
WORDSTAR £275 (a) WORDSTAR Upgrade to W/S Prof £195 (a)

DBASE-II Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation through to running accounting ledgers and payrolls. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data. Fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful.

SAGE ACCOUNTS: This package has been designed for the smaller business, for the user who is unfamiliar with computers but wanting or needing to computerise the bookkeeping and accounting functions. Sage is easy-to-learn and easy-to-use and is complete with a full tutorial booklet and a free manufacturers 90-day 'Hot-Line' support. It is a truly integrated package (all on one disc!) and covers Sales, Purchase & Nominal Ledgers, with a capability of handling up to 9999 accounts per ledger. It will handle all your Sales and Purchase invoices and can easily generate account & management reports. **£375 Sage plus (£695)** for the larger business, and **Sage Payroll (£195)**

Other packages available include PRO-PASCAL, CIS-COBOL, Supercalc II, MACRO-80 etc. Please telephone with your requirements.

A.T.I. Trainers — these superb interactive training discs simulate the package being studied. A unique screen technique provides a friendly interaction — in the upper area, a faithful reproduction of the screen is displayed, while at the bottom, a series of prompts and explanations lead the student through the exercise. ATI trainers available include Wordstar, dBase-II, dBase-III, Multimate, Multiplan, Word at **£75 (b).** Please phone for other trainers.

TORCH GRADUATE IBM SOFTWARE: We are able to supply most popular software packages including: WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

PROFESSIONAL SOFTWARE PUBLICATIONS

Wordstar made easy	£16.95 (c)	Multimate Complete Guide	£16.95 (c)
Introduction to Wordstar	£17.95 (c)	ABC of LOTUS 123	£15.95 (c)
Wordstar Handbook	£11.95 (c)	The RS232 Solution	£17.95 (c)
dBase-II for the first time user	£16.95 (c)	CP/M Bible	£15.95 (c)
Understanding dBase-II	£22.95 (c)	Soul of CP/M	£14.95 (c)
Understanding dBase-III	£22.95 (c)	CP/M Handbook	£14.95 (c)
Multiplan Made Easy	£18.95 (c)	Mastering the CP/M	£17.95 (c)
		Computer Spreadsheets	£7 (d)

(no VAT on books)

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(c) £1.50
(d) £1.00

MONITORS

(All Monitors supplied with BBC Lead)

RGB MONITORS

1431 14″ RGB Std Res	452 × 585 pixels	**£179 (a)**
1451 14″ RGB Med Res	653 × 585 pixels	**£229 (a)**
1441 14″ RGB Hi Res	895 × 585 pixels	**£375 (a)**

MICROVITEC 14″ RGB/PAL/Audio

1431AP 14″ Std Res	452 × 585 pixels	**£199 (a)**
1451AP 14″ Std Res	653 × 585 pixels	**£275 (a)**

The above monitors are available in plastic or metal case.

MICROVITEC 20″ RGB/PAL/Audio
2030CS 20″ Std Res **£380 (a)** **2040CS** 20″ Hi Res **£685**

TAXAN 12″ RGB
K12SV3: A high performance high res monitor with desk matt screen with options to switch to monochrome green/amber. IBM Compatible **£330 (a)**

MITSUBISHI XC1404 14″ Med Res RGB:
BBC/IBM Compatible. A new monitor with etched dark screen with both brilliance and contrast controls giving sharp graphics and text display. **£229 (a)**

MONOCHROME MONITORS

TAXAN

KX1201G 12″ HI-RES green etched screen	**£90 (a)**
KX1203A 12″ HI-RES amber etched screen	**£105 (a)**

PHILIPS

BM7502 12″ HI-RES green screen	**£75 (a)**
BM7522 12″ HI-RES amber screen	**£79 (a)**

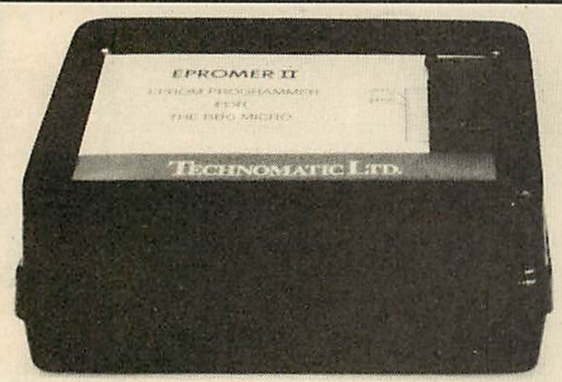
ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors)	**£20 (c)**
Taxan Swivel Base for mono monitors with integral clock	**£22 (c)**
Philips Swivel Base	**£14 (c)**
Monitor Stand. BBC B + B **£10 (c)** Master	**£12.50 (c)**
Double Tier Plinth. BBC B + B	**£19.50 (b)**
Taxan RGB Cable **£5 (d)** Microvitec RGB Cable	**£3.50 (d)**
Monochrome BNC/PHONO Cable	**£3.50 (d)**

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational users. Supplied with a users handbook and utilities disc containing starter programs and development software.
Touchtec 501 **£255 (b)**

EPROMER II



A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered.
* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
* Eproms upto 16K (27128) programmed in single pass (27256 in two passes).
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Data input from keyboard/Tape/Disc/Eprom.
* Software interface for integration of user's special requirements.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.
* Checksum facility allows for easy identification of programmed roms.
* Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc **£99 (b)**
ROM based software **£10**

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 (b)**
UV1B as above but without the timer. **£47 (b)**

MERLIN

NEW

A new advanced disc-users utility.

This 16K rom-based utility is one of the most comprehensive packages offering many unique features. Its over 50 commands are all fully tube compatible. It is supported by a 100 page manual. This package is aimed primarily at disc users with the BBC B and the B plus. (Master version available soon).
Major Features:
DISC UTILITIES including:
Disc editor, with search, verify and repair utilities. Clone utility, backup/edit of protected discs. A special formatter to speed up disc accesses. Tape archive of discs and tape/disc transfer utilities. Screen compaction. Vastly improved copy and backup facilities.

MACHINE CODE UTILITIES including:
Memory search and edit, disassembly with 65C02 codes supported, switching between roms, main memory and tube, examine fx and osbyte calls.
MERLIN with 100 page manual **£37.50 (b)**

Send for the detailed command listing.

REAL-TIME CLOCK CALENDER

A low cost-unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. **£29 (d)**



ROM/RAM EXPANSION SYSTEMS

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sidewaysd rom expansion to 16 ROMs. One socket has been split into two 87K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board **£37 (d)** Battery Backup Kit **£18 (d)**

ATPL Board for BBC Plus 10 × 16K ROMs **£29 (d)**

COMPUTER VILLAGE CV-16 Rom Board **£38 (d)**

A neatly designed, simple to instal board allows full sideways rom expansion on the model B. Two sockets for 8K CMOS RAM allow a total of 16K for which battery back is fitted as standard. **£35 (d)**

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction. attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£79 (b)**

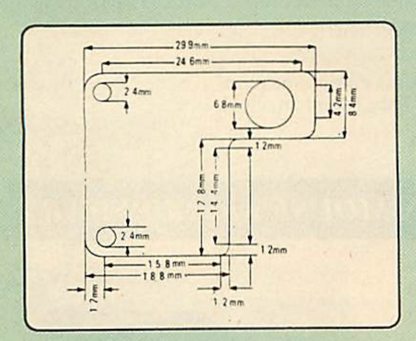
(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)

NOVACAD
Computer Aided Draughting for the BBC Micro

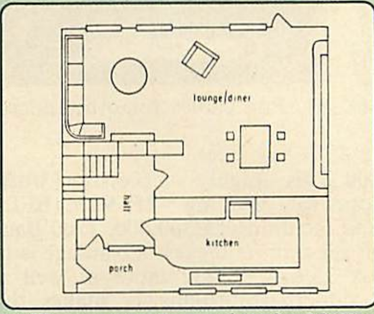
A sophisticated CAD package with unique facilities which until now were confined to custom built CAD packages.

Whether you want to draw a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC micro model B fitted with Acorn DFs and a single disc drive. If you have a 6502 2nd processor and a dual disc drive NOVACAD's capabilities are further enhanced.



* Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. The drawing can be 4 windows across and 5 up.
* Libraries of user defined ICONS such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. ICON size is not limited to a number of pixels. An ICON can contain up to 500 lines, so complete drawings or sections of large drawings can be saved as ICONS for use with other drawings.
* ICONS can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.
* Shapes can be copied on the screen as many times as required.
* The zoom facility allows the user to magnify any section of a drawing by up to 20 times to make it easier to insert details.
* Horizontal and vertical displacements can be measured in any user defined scale.
* Any two colour can be used in mode 4.
* Up to '8 levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly used in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
* Text can be added at any position vertically or horizontally.
* Use of 2nd processor will allow use of any 4 colours, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
* Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
* Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
* An optional plotter utility contains a plotter configuration program allowing the user to configure a program for his plotter. Pre-configured programs are included for Epson HI80, Hitachi 672, Penman, Plotmate and HP GL.



NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

NOVACAD package with 16K ROM, Utility disc and a comprehensive manual £79 (c).

Novacd compatible with Tracker Ball/AMX Mouse £99 (c)

Stand Alone Mouse for use with NOVACAD £34 (d)

Upgrading of existing ROMs and DISCS £20 (d)

Plotter Utility Program £28.50 (d)

NEW META VERSION THREE



* **Assembles for even more processors**
* **Now over 70k long on 2 Roms and 2 Discs**
* **Dozens of new options, features and directives**

The Original META system sold hundreds worldwide; it's being used in Universities, Polytechnics, British Telecom, the BBC, the MOD etc etc.

Now there's an even better version. It comes on two Roms and two Discs for your BBC or BBC+ and a single rom with disc for the Master and gives you complete Editing and Assembly facilities for all the listed processors:

1802	68HC11	6808
HD 64180	68000	6301
Z80	8048 Series	6303
6502 (including *all* CMOS varients)	8051 Series	6305
	8080	6801
65C812	8085	6803
65C816	Z8	6805
6800	68120	6804
6802	68121	6809

META uses the appropriate standard mnemonics for each, eg. LD (HL) 0ABH in Z80 and MOVE. B DO, $S0 (A5, D6.L) in 68000 etc.

Full nestable Macro facilities are provided, and nestable conditional Assembly, (IF/ELSE/ENDIF), Modular source code (including parameter passing). True local and global labels, 32 bit labels and arithmatic (incl. MIL, DIV, AND, OR, XOR, SHL etc). 30 ways to send object code during Assembly, including Intel Hex, S.Record, Binary etc to Disc files, RS423, EPROM emulators etc, local reassembly and over 50 directives, including DS.X, DC.X, EQUX, FCB etc).

Wordwise-style Editor integrated in with Assembler; Search/Search-Replace, Block copy/delete, markers etc; dozens of special features and functions for Assembly code programmer. Fast and Friendly to use.

Plus special new serial Communicator Area with Complex Option page etc.

Send for your detailed spec sheet on the META Assembler and the PORTAL EPROM Emulators. Set of disassemblers and Logic Analyser coming soon. **£145 (c)**

Please specify the computer type when ordering.

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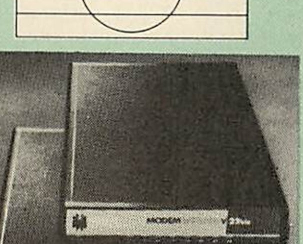
Orders welcome from government depts & educational establishments.

All prices ex VAT
Prices are subject to change without notice

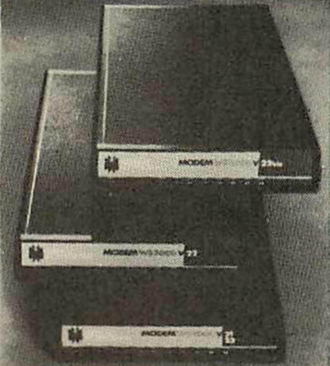
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(c) £1.50
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COMMUNICATIONS

MIRACLE WS3000 Range: * A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. * HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. * All models feature a centronics compatible printer port allowing direct output to a printer. * A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. * An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. * Line noise filtering ensures error free transmission and reception of data on long or noisy lines. * Internal battery backup allows storage of 63 names and telephone nos. * This range of modems can be factory fitted with high security data access protection system. * Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.



WS3000 V21/23: This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300bps, 75/1200bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. **£295 (b)**



WS3000 V22: This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. **£495 (b)**

WS3000 V22bis: This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. **£650 (b)**

BBC Data Cable for WS3000 £6 (d) Data cables for other micros available.

MINOR MIRACLES WS2000 This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000 £102 (c)** Data Cable **£7.**

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£4 (d)**

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

SKI KIT (Allowing total control of the modem by your computer) **£10 (d)**

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10 (d)**

GEC DATACHAT 1223 Modem: An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. SPECIAL OFFER **£75 (b)**

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£24 (d)**

COMMUNICATIONS SOFTWARE

CONNECT-3000 AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the *3000* — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
40/80 Disc **£16.50 (d)**

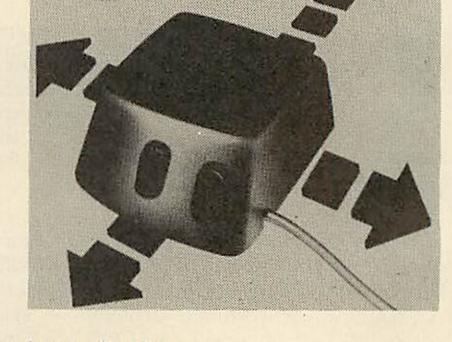
TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**
RS232 Solution (Book) **£15.95 (c)**

COMMSTAR An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£28 (d)**

RS232 SolutionBook **£17.95 (c)**

AMX MOUSE with SUPERART



The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot pattern editing, use of icons, additional text styles, superb zoom in colour.
There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.

AMX Mouse with Super Art **£67 (d)**
AMX Super Art Package on its own **£43 (d)**
AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system. **£43 (d)**
AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics. **£21 (d)**
AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record. **£21 (d)**

RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.
RB-21 (with 'icon artmaster'). **£59 (c)**

BBC COMPUTER SPARE PARTS

Complete Keyboard	£52	UPD7002	£5.00
Power Supply Unit	£52	DS3691	£3.50
Keyswitch	£1.75	7438	£0.40
Keyboard Connector	£4.00	74LSOO	£0.24
Video ULA	£18.00	74LSO4	£0.24
Serial ULA	£14.00	74LS10	£0.24
UHF Modulator	£4.50	74LS123	£0.80
6502A 2MHz CPU	£6.50	74LS163	£0.75
65C02 CMOS CPU	£12.00	74LS244	£0.80
6512AP CPU	£12	74LS245	£1.10
6522 VIA	£3.50	74LS373	£0.90
6522A 2MHz VIA	£5.50	74LS393	£1.00
LM3 24 op-amp	£0.45	8271	£46
SAA 5050-Teletext	£9.00	88LS120	£3.00
6845SP CRT Controller	£6.50	4464 RAM	£8.00
		O/S Basic B+	£25

All the above carry Carriage Code (d)

FIRMWARE AND SOFTWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. £39 (d)

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. £49 (d)

MASTERFILE II The new version of the popular general purpose file management system allowing large amounts of information to be stored and processed. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. This latest version features many new facilities including use with WORDWISE/VIEW £17.00 **(d)** Disc (80 or 40T).

GEMINI'S DATAGEM £59 (c)

WORD-PROCESSORS

VIEW Acorn's version V2.1 word processor rom. £39 (c)

VIEW VERSION V3.O Also compatible with BBC + Complete with Printer Driver Generator. £60 (c)

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £36 (c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £10 (d)

VIEW PRINTER DRIVER GENERATOR: This driver generator will enable you to produce a driver to suit your printer and also let you view the text as it will appear on the paper including condensed, italics, sub and super script modes. £8 (d)

VIEWSPELL: A rom based spelling checking utility with a dictionary of 70,000 words on disc. Additional/specialised dictionaries can be created. Facility to search the dictionary for words beginning with or ending with certain characters. £52 (d)

WORDWISE £28 (d)

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. £45 (d)

WORDEASE A rom based utility for the Wordwise plus. £24.50 (d)

SPELLCHECK III A 16K rom based program for View and Wordwise plus. Contains 2000 words on the rom and 6000 (expandable to 17000) on disc. £31 (d)

EDWORD II £43 (a)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £39 (d)

VIEWPLOT: A disc based Linear graph/barchart/piechart plotting program. £25 (d)

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £45 (c)

INTERCHART Graphics Package for the Intersheet. £30 (d)

ULTRACALC £49 (d) **QUICKCALC** £14.50 (d)

LANGUAGES

META-ASSEMBLER: For full details please see page 6 of this advertisement.
Meta-Assembler £145 (c)

ACORN P-SYSTEM A portable operating system supplied complete with USCD PASCAL and FORTRAN 77. £259 (b)

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £39 (d)

ACORN MICRO-PROLOG: The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. £62 (c)

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £48 (a)

ISO PASCAL Stand ALONE GENERATOR: Utility to convert programs produced using ISO PASCAL for stand alone applications. £28 (d)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £49 (b)

LOGOTRON logo £56 (c)

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. £46 (b)

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. £17.30 (d)

BCPL STAND ALONE GENERATOR £39 (d)

Acorn LISP Rom, Acorn FORTH Rom, Acorn COMAL, (each) £39 (d)

MICROTEXT A frame based authoring system from National Physical Laboratory for interactive computer tutoring. Disc based. **Disc** £49 (c)

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LETTERS

Write to Letters, Acorn User, 141-143 Drury Lane, London WC2B 5TF

RESPONSE ON THE NETWORK

Sir, You were kind enough to print a letter from me in your November '85 issue of *Acorn User*. In that letter I stated my intention of setting up an Econet User Group. The reponse has been very gratifying. Replies were received from all over the world (a tribute to the distribution network of *Acorn User*).

This has enabled me to formalise a constitution for the user-group and the first issue of the user-group newsletter was a great success and has been completely sold out.

The group will be called simply 'Econet User Group (Scotland)'. Membership is open to anyone with an interest in Econet and related systems from anywhere in the world.

The tag 'Scotland' is not an indication of a geographical restriction but simply to signal that the group is not being set up to preclude similar local groups. If no other group emerges that tag will eventually be dropped.

Thank you again for your help.

Michael Ryan
Angus

A WORD ON ECONET

Sir, I work at an Adult Education Centre where we have a well-equipped computer room using 18 BBC micros linked with Econet using level 1 file server software. Our 18 micros are also fitted with *Wordwise* wordprocessing ROMs.

Our problem is that *Wordwise* cannot be used with the Econet in operation, unless the stations leave the network by selecting the tape filing system.

This means that we cannot use Econet for loading or saving documents, severely restricting the usefulness of *Wordwise* for teaching purposes.

On contacting Computer Concepts we were told that *Wordwise* would only work with level 2 file server software – which isn't much help when you consider the extra costs involved in getting a second processor and the necessary software.

If there was some simple solution it would save us a lot of money and give a much more useful computing/word processing teaching resource.

Can you help?

Peter Kranz
Guildford Adult
Education Centre,
Surrey

We asked Charles Moir at Computer Concepts who told us that *Wordwise* does not work on level one Econet systems for exactly the same reason that the Basic statements OPENIN, OPENOUT, BPUT#, BGET# do not work. This filing system does not support the random access filing operations required by *Wordwise*.

The only solution we know is to upgrade to level 2 Econet as the level one file server is rather primitive and now out of date.

However, Computer Concepts said this only applies to *Wordwise*. *Wordwise Plus* uses different filing system calls and so should work on all networks.

DOTTY OVER A HEAD

Sir, Can anyone provide the name and address of an agent who would be willing to sell or repair a printer head for my Riternan printer, as I have lost a 'dot'.

I've not been able to identify one from my back numbers of your excellent magazine.

John C Dering
Dorset

CONTROLLING THE BEEB

Sir, I am going to tell you how to improve on perfection.

My friends and I believe that if you were to run a series on building simple electronic devices for the BBC micro, for example, light pens, logic probes and maybe even a simple robotic arm, you'd achieve this.

Keep up the good work.

David Bonehill
Worcs

Thanks for the suggestion concerning simple electronic devices. We do little on hardware as we find the electronics magazines do a much better job and are full of computer projects these days.

We did build a lightpen, however, back in March '83. Other hardware features include an activity board by Susan Kingsbury (August '84), a musical keyboard by Joe Telford (December '84) and a light receiver (August '85), also by Joe Telford.

Books you might consider are *Hardware Projects for the BBC Micro* from Century Publishing by Joe Telford, *The BBC Microcomputer in Control* from Prentice Hall by Paul Beverley & others and *Beginner's Guide to Interfacing the BBC Micro* from Macmillan by Martin Phillips.

TIPS ON TABS

Sir, This very simple 'tip' may be of help to readers like myself who have searching for a supply of write-inhibit tabs for discs for a long time.

All the ordinary paper labels from stationers rapidly peel off the disc cover, causing occasional jamming of the disc in the drive and I have not been able to find proper tabs other than those supplied with packs of discs.

I happened to be using some Fablon adhesive covering, usually sold for covering kitchen shelves, etc, the other day and out of curiosity tried a small piece as a tab; it works beautifully, I assume because the adhesive must be formulated for permanent attachment. The cost is negligible – mine was 84p per yard, about 18in wide, so hundreds of tabs can be cut for less than 50p. In fact I simply used the left over bits from the job in hand and have enough tabs for dozens of discs.

B L Hensman
West Yorkshire

LONG LIVE MAN FROM UNCLE!

Sir, Can I add my voice to the critics of your new page numbers? Can't you at least make them larger and bolder than they are now? However, as to removing Acorn Abuser's Diary – over my unpaid subscription!

I regard it and the Man From Uncle as two of the best parts of the magazine, and something not found in any other computer magazine I have read.

I have also noticed that tape users seem to be being left out. I know Acorn is moving towards discs as standard (and I myself have a disc drive) but have you considered how many people don't? Perhaps a reader survey would be a good idea.

Having said that, for my money *Acorn User* is the best magazine about for Acorn machines. Keep up the good work.

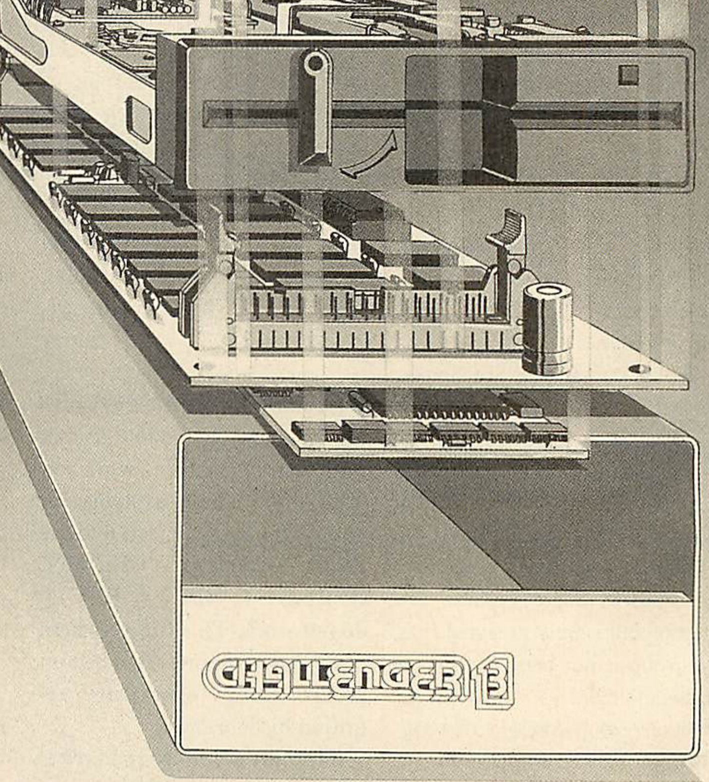
Tony Cains
Cleveland

We've increased the page number size since April. What do you think?

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LETTERS

SPLITTING THE CODE

Sir, I'm sure this can't be the only letter you'll get about Steve Picton's article in your February issue. His method of splitting a large amount of source code into several separate programs is much better than having all the source and object code of an assembly language program in memory at the same time.

However, using Steve Picton's method you can only pass a few, unmemorably named variables between sections of your source code, and there exists a different but much more versatile way which allows every label and variable (long names and all!) to be accessible to all the separate programs.

Now guess which magazine published it . . .

I recommend that anybody who wants to write long assembly language programs should read the relevant parts of Jonathan Griffiths' (author of *Snapper, Rocket Raid* and *JCB Digger*) article in *your* January '84 issue. The technique is simple, and if you write machine code, it's invaluable.

Perhaps it's worth publishing again if even your editorial staff have forgotten it!

Michael Beaton
Dorset

Good point Michael, but the major advantage of Steve Picton's technique is the use of sideways RAM.

PLANTING IDEAS

Sir, I am a tutor on the Youth Training Scheme, lecturing on horticulture and animal care (dogs, cats and rodents).

I am looking for software that I could use on these courses, on our BBC computers.

I am specifically interested in programs for elementary biology, about CSE level and above, covering such topics as animal anatomy and physiology and the structure and function of plants.

I am also searching for programs on the care of pets and gardening topics. I understand there is a program called *The Planter's Guide* available, though I don't know its source.

I would be most grateful if anyone could send me details, to the address below, of sources I can follow up.

D Wright
Youth Training Scheme Unit
Albert Road, Whitefield
Manchester M25 6NH

STALE SOFTWARE

Sir, After using the accompanying *Welcome* programs a lot on my BBC B+ 128k computer I found they became boring, so I went into the shops to see the software available for my Beeb.

I was frustrated that the only software available used up a quarter of my computer's memory which I find an awful waste. The software was also either difficult to find or there was a serious lack in the shops.

Some of the software I did purchase was appalling (eg, the graphics and gameplay of Geoff Capes' *Strongman* by Martech) and some wouldn't even load (*Beach Head* and *Killer Gorilla*).

I spent almost £500 on my B+ and find it's becoming a waste of money. It's as if while the Beebs are upgraded the software stands still. Software houses, I read, keep complaining about the lack of memory on the Beeb and yet when more is given to them they do not exploit it. Even the less established computer from Amstrad has a wider software range than the BBC.

There must be thousands of people who own sideways RAM Beebs or 64k and 128k and even Master series Beebs – software houses do not seem to realise the amount of money that can be made from sideways RAM.

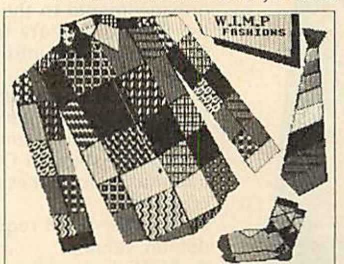
Also, the sound of the Beeb leaves a lot to be desired.

So, software houses, please *do* something about it.

L L Cook
London

SCREEN SWAP

Sir, Chris Parker, in his letter regarding my review of AMX *Super Art* (*AU* May), seems to have misunderstood my comments about the transfer of screens for use in the program. I use a wide range of software packages including the excellent *Paintbox* and *Freehand* programs from *Acorn User*. However, I have yet to find a program which supplies all the facilities I want, so it is essential, for me, that screens can easily be transferred from one package to another.



Super art from *Super Art*

Using most programs I can do this relatively easily. My complaint about *Super Art* was that it does not provide a facility to convert existing mode 1 screens for use in *Super Art*. This is not quite the same as loading mode 4 AMX *Art* pictures into *Super Art* to which Mr Parker refers.

In my view this seriously restricts the value of *Super Art* as a drawing package and I have therefore not really made as much use of it as I would like. I have contacted Elliott Software several times with regard to this problem but have not yet received a reply. Perhaps one of your readers might be able to help?

Jonathan Inglis
London

MINUS A PLUS 2

Sir, I am currently responsible for the running of an Econet system (level 2) in a medium-sized comprehensive school, even though I am still a fifth form pupil. The system comprises entirely of BBC micros but I wish to add an Electron since the system is, at the moment, only used for programming and in this respect the Electron has very few differences to the Beeb.

Recalling an article I read in a magazine about 18 months ago I wrote to Acorn asking if they did produce an Econet interface for the Electron – I believe it was to be called the Plus 2. Acorn replied that it did not produce such an interface but to try Pace, which couldn't help either.

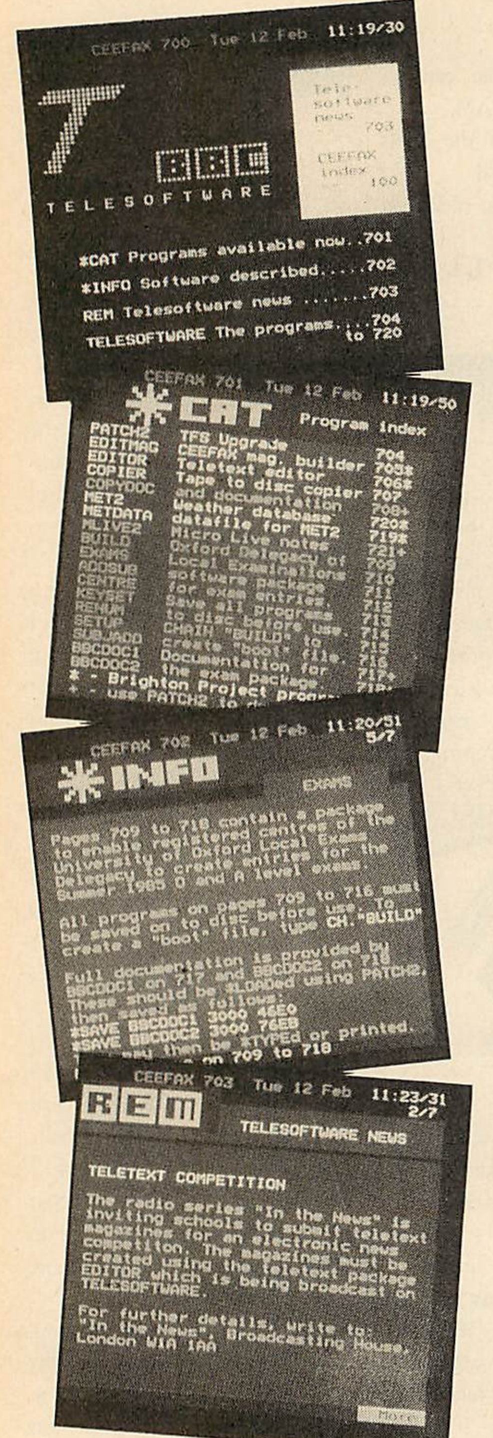
So, I am stuck. It is clear that Acorn intended to produce a Plus 2, if not then why is there a Plus 1 and a Plus 3? Also several books and magazines which were published around the date of the Electron launch say that this would be possible. I'd like to hear from anyone who has successfully put an Electron in a network. I presume that the Plus 2 was either cut after Acorn's problems or to force schools to buy the more expensive BBC micro.

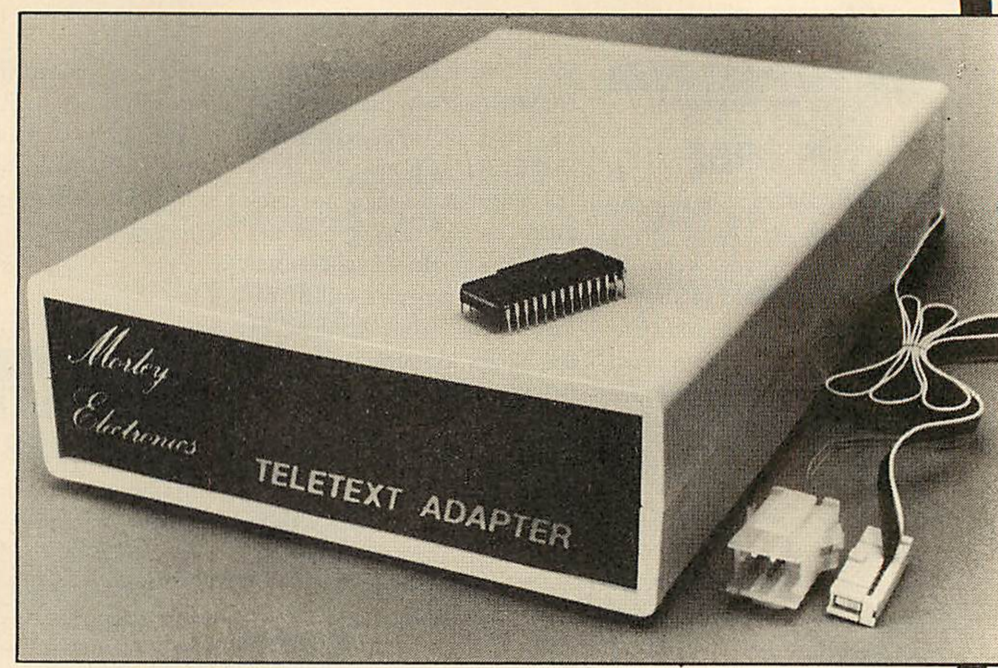
May I also just make my comment on the Master series. Why does the ET not have *View*, *Viewsheet* or the Basic Editor? For bulk purchases, 128k ROMs cannot be that much more expensive than 64k ones.

Allan Kelly
Merseyside

Acorn did talk of an Econet in the Plus 2 for the Electron, but this has been dropped. One possible source of help is in Holland, where Jan Mars has developed both RS232 and networking interfaces. Details from Jan Mars, Nieuwe Herengracht 255, 1011 SP Amsterdam, Holland.

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ELECTRON TELETEXT ADAPTER
Electron adapter now available, including emulated Mode 7 allowing you to run long Adventure type programs.

1 megabyte RAM disc configured as a drive. Should be available 2nd week of Jan. Please ring for details.

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AA35A

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YOUTHFUL USERS

Sir, As a full time youth worker responsible for a youth centre in Northern Ireland, I am undertaking a research project into the 'use of computers in youth clubs' with particular interest in programs which promote 'social education' and involve groups of young people in the use of machines.

Like many of your readers, I find a lack of software which specifically covers this field, and I would welcome contact from anyone who may have developed their own programs which may fill this need.

Ultimately I hope to compile a tape package for distribution to interested groups at cost price and any materials supplied will be credited to the author who will be provided with a pack free.

Anyone with material they feel would be appropriate please contact me at (0247) 467788 or by Prestel mailbox 467788.

James Thompson
Principal,
Project Bangor Youth Centre,
Bangor, Northern Ireland

TROUBLE WITH TELETEXT

Sir, On the basis of the review of the Morley Teletext Adaptor in the January issue I bought one.

I first attempted to use it on New Year's Day when at 9am I started to download some of the programs. By 2pm I had been unable to download a single item and began to suspect all items in the chain of use. I was able to prove that the aerial and lead were efficient, and felt sure that there was some defect in the adaptor.

I contacted two boffins in this area – one using the Acorn model and the other the Morley. They both confirmed my experience in being unable to download anything at all. One of them contacted the BBC Television Engineer in London, only to discover that the staff had failed to put on the booster in the morning, thereby making it impossible for anybody to download throughout the day.

Attention was promised when the new shift came on at 5 that evening and a notice was added to page 701 promising resumption of service at about 6pm. In fact it was at least 7pm before any work could be done.

I gather from my experienced friends that the BBC handling of the Telesoft material is, to say the least, chaotic, and in spite of promises of wonders to come, the service is deplorable.

In short it is encouraging enthusiasts to purchase costly equipment for which it gives a very mediocre service. The opinions of other readers would be most welcome.

F Harvey
Chichester

Lawson Brown from BBC Telesoftware replies: The problems Mr Harvey is experiencing fall into two areas: the only fault which can occur in Ceefax transmission is in the calculation of the cyclic-redundancy check bytes. This will give consistent reports of 'CRC error' or 'Bad data' on *every* page.

At present, the CRC is only recalculated when the Ceefax system is re-booted (I assume this is what Mr Harvey means when he refers to a 'booster'). This process is normally carried out early in the morning to take account of the data change.

Unfortunately, on January 1, this process was overlooked. It was not obvious since it does not affect ordinary Ceefax, and I am sure our engineers carried out the necessary work as soon as they were notified of the problem.

However, new transmission software is now being installed which will eliminate the need for this operation. The second problem is reception. The random occurrence of CRC errors is caused in virtually all cases by local conditions – either in poor aerial systems, co-channel interference or locally generated reflections.

Downloading difficulties with particular files are almost exclusively caused by adaptors which are not part of the BBC Microcomputer System, and whose software fails to implement the transmission specification correctly. A common fault with these units seems to be their interpretation of header command sequences. The telesoftware specification is readily available for use by manufacturers, but as I am sure you will appreciate, the BBC has no influence over third party products.

HELP FOR HOLLAND

Sir, Let me first introduce the school which I am principal of. It is a 'basisschool' for pupils in the age range 4-12 years old. In the town of Groningen it is the only school which possesses any hardware and software.

We use an Econet-system with four BBC micros, as well as a mother machine with double disc-drive and a printer.

We would like to hear from schools using computers, to exchange ideas and software in the education area, at this address: T Kompas, Chr. school voor K.O. en L.O., Valreep 67, 9732 EJ Groningen, Holland.

W v d Werf
Groningen,
Holland

QUICK ON THE DRAW

Sir, Perhaps you can help me with a particularly knotty problem on my BBC model B OS 1.2. I am using the PLOT85 filled triangle draw command for a specific application. For blocking in equal areas the command becomes much slower when the area to be drawn is tall and thin rather than short and fat!

I need to replace it completely with a machine code routine writing directly to the screen which I can call from my program giving similar parameters to those used for the PLOT85 command.

Can you point me in the direction of a similar but faster assembler routine?

It can be a triangle draw or a four-sided shape draw routine, but if it is the latter, it must be able to cope with the situation where two opposite sides cross over, giving the effect of two triangles joined at the apex. It must use the corner co-ordinates for reference – reliance on boundary lines to define the area to be filled is not possible in my application.

It need not be a general purpose routine so long as I can tailor it to mode 5 and the screen window I am using. My knowledge of machine code is good enough for me to modify a well-explained routine, but I couldn't decipher a wodge of assembler without accompanying comments and clear description of the method used. Can you help?

P H Vasey
Tyne and Wear

BEAT THE DRUM

Sir, Please can you give some details of where I can buy a good drum synthesiser for the BBC model B. I have tried Studio 8 by Beebugsoft and, although it is a very good program, I would prefer a package which is totally dedicated to the drum sounds.

T Huckle
17 Kingsley Road,
Bedford

***Drum Kit* was published by Quicksilva which was taken over by Argus Press Software, 1 Golden Square, London W1R 3AB.**

LETTERS

HOBBIT TURNOVER

Sir, I notice that the disc version of the *Hobbit* adventure game from Melbourne House comes on a special disc, both sides of which can be used on a standard 40-track single-sided single-density drive, simply by turning the disc over.

Can you or any of your readers please advise me as to where (if at all) such discs can be purchased. I am sure they would be of use to many BBC disc users, especially as it effectively doubles the amount of information that can be held on one disc.

Kelvin Lawrence
Sussex

Contact Mirrorsoft, Headington Hill Hall, Oxford OX3 0BW.

EDUCATIONAL ADVENTURES

Sir, We were delighted to read your kind remarks in the March edition of *Acorn User* concerning our package *1914*.

It is encouraging to know that the amount of research and work that went into this package was such as to make it a suitable example for your readers.

We should have been even more delighted if we had found our work credited at the end of the article in question particularly as in other parts of the same issue you are at pains to emphasise the role of educational software houses.

We are concerned that schools should be encouraged to use the concept of the adventure game as a basis for education. There has been a tendency to consider a lot of educational software as 'just games to keep the kids quiet' and to lump such material in with the space-invaders and the skill-and-drill type program.

By the use of adventure generators along with wordprocessors we can move the child away from the computer itself and into contact with the real skills of decision-making and creative thinking. Because we actively pursue this policy we involve teachers in every aspects of our software to enable us to produce packages such as *1914*.

Details of all our products can be obtained by writing to us at Netherhall Educational Software, Cambridge University Press, University Printing House, Shaftesbury Road, Cambridge CB2 2BS.

Paul J Blissett
Netherhall Educational Software, Cambridge

REVVING ERRATICALLY

Sir, I have put up with your new design, I have put up with your microscopic page numbers, but this time you have gone too far.

I used to enjoy typing in the small, helpful programs in your 'Hints and Tips' section but now you have stopped putting them in. I, like many others, look upon long listings with horror and don't even attempt to type them in, so please put back the small programs as I found them more helpful than the others.

Next, I am tearing my hair out at *Twin Kingdom Valley*. I got the treasure chest, but, alas, I cannot go any further. Any help?

Also, I am having trouble loading my tape version of *Revs*. It loads up to 'Rev 1' but from then on does nothing; no message appears and it does not load anything. But if I leave the computer off for a day or two it loads, and it works all the time on my friend's BBC micro.

The shop won't give me my money back (they supplied me with another tape but it did the same!) What is wrong with it? I tried a different tape recorder, cables, etc, but it does not change. Is something wrong with my computer? Can you tell me what is wrong, please?

Chris Murray
Berks

We're stumped on *Revs*. Anyone got any clues?

SILVER IN THE VALLEY

Sir, Please can any of your readers help me with my Electron version of Bugbyte's *Twin Kingdom Valley* adventure?

Bugbyte has disappeared into oblivion, and with it, Trevor Hall.

Question: is there a silver key? If so, where?

I have 1012 of the necessary 1024 points but cannot get the other 12. A diamond ring is worth 12, but I cannot find more than one. A silver key ought to rate 12. If other readers have found one I reckon Bugbyte forgot to include it in my recording!

And why does the Princess always flee? Why doesn't she recognise me?

Lastly: does everyone's copy hang up when you die or can you start another game without having to re-load the lot? I wish I could.

Great game though, fabulous.

Pam Milne
Warrington

BACKWARDS TO SUCCESS

Sir, It's nice to hear that someone is still playing that colourful game *Twin Kingdom Valley* from Bugbyte. Well, here is a helping hand to those lost adventurers, especially Nicholas Tomlinson.

I have compiled the hints in the form of riddles. These are written backwards so as not to catch the eye of any adventurer who prefers to press on with them.

To get out of the prison:
HGIHS IE BIR BE HT FILU EB NACY REBIRB

To get the bronze key off the witch:
GNIH TONR OF GNIHT EMOS TE GTNOD UOY

To get the master key:
TITEG OT FFATSC I GAME HT D NIF

To get the silver key:
DE DRAWER E BOT SSEC NIR DE HT EVAS

To finish:
HSI NIF OTK OOL TUSL.

Now, what I need to know is how to get the magic wand from the witch in Micro Power's *Castle Quest*.

If anyone can help, please write to me via *Acorn User*.

Jimmy Liu
Eire

CALL FOR MARVIN

Sir, To settle the argument between Mark de Weger and Colin Lindsay over how many CALLs would have to be made to produce as many programs as possible, for the Beeb, why not get Marvin to do the maths and then send the small furry creatures back to Alpha Centauri, which is where they really belong!

I really must go now as I've just picked up a message on my Sub-Etha Sens-O-Matic about some Vogons . . .

P Smith
Leics

ON THE RIGHT TRACK

Sir, I am interested in using my BBC micro to assist in the control of a model railway layout.

I wonder whether any of your readers have any experience in this subject and could offer me any advice? Any help would be most welcome.

David Watkins
21 Gosford Way,
Polegate,
East Sussex

HINTS & TIPS

Martin Phillips sets about trapping errors, scrambling the horizontal register and contrasting backgrounds for the colour-blind

TRAPPING ERRORS

The 'On error' statement is a useful feature of BBC Basic. It allows more elegant ways of ending programs when faults are found than the blunt error which Basic normally throws out. Some errors are out of the control of a program, so need to be trapped in this way.

Many disc faults fall into this category. For instance, if a program is writing to a disc, what happens if the disc is not formatted, or there is a write-protect sticker on it? In the latter case, the message 'Disc read only' is given which is fine for someone who understands all about discs and what read and write means. To make it plain, you could put a routine in, thus:

```
ON ERROR IF ERROR = 201 THEN
PRINT "Please remove the write-protect"'
"sticker and start again":
RUN:ELSE REPORT
```

Error 201 is the 'Disc read only' error. Better still, test to see if the write-protect sticker is in place at the start of the program by first putting in the 'On error' statement and then issuing a *OPT 4,3 call.

Don't use 'on error' routines in a procedure as the stack, which has pointers to these procedures, is cleared when an error is met, and this generates a new error. The computer goes round in small circles creating new errors for itself. You can use ON ERROR GOTO. . . provided the GOTO is not going into a procedure (which is a very annoying feature of BBC Basic). Listing 1 on the yellow pages should work: if an error is found (and line 80 makes certain of that) the program should jump to PROCerror and then end the procedure PROCtest. Try it to see what happens. You will need to press Break to stop it, as Escape causes another error.

The way round this is to either change line 60 to read something like:

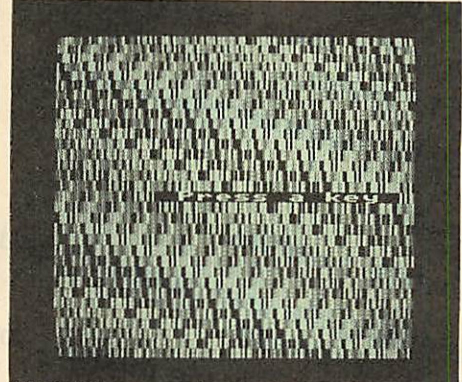
```
60 ON ERROR PROCerror:GOTO30
```

or change line 140 to read:

```
140 END
```

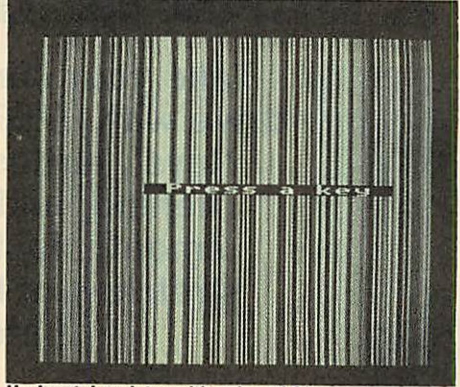
£5 STRANGE EFFECTS

Arieh Stern and Ariel Yankilevich from Israel have sent in a nice little routine to produce an



Effect of changing register's value

interesting screen effect – they win £5 for their efforts. The routine modifies the internal register of the BBC micro's 6845 CRTC register (it won't work on the Electron because it does not have this chip in it). The register changed is the horizontal display register which normally has the value 80 stored in it for modes 0-2, and 40 for modes 4 and 5 (mode 7 does not use the 6845 CRTC chip). Changing the value in this register does not have a great deal of practical



Horizontal register with value of 80

use, but it can produce some strange effects in the graphics modes – it messes up the screen and mixes up the graphics and text. By bringing the register value back to normal, the screen display begins to unscramble and you get the original screen display. If a value greater than the default value is used, the screen display collapses altogether. To try the effect in mode 1 type n the following line:

```
FOR G%=0 TO 80:?&FE00=1:=G%:
A%=INKEY(25):NEXT G%
```

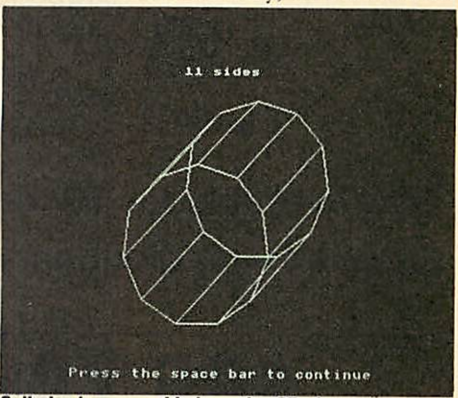
A%=INKEY(25) has been inserted to create a slight delay, so it's easier to see the effect. Instead of poking values into locations &FE00 and &FE01 we could have used a VDU call:

```
FOR G%=0 TO
80:VDU23,0,1,G%;0;0;0:
A%=INKEY(25):NEXT G%
```

Listing 2 on the yellow pages is a demonstration program to show the effect in each of the graphics modes.

£5 3D ON THE ELECTRON

One of our regular readers, Electron-owning Bernard Emblem from Bury, has sent in a short



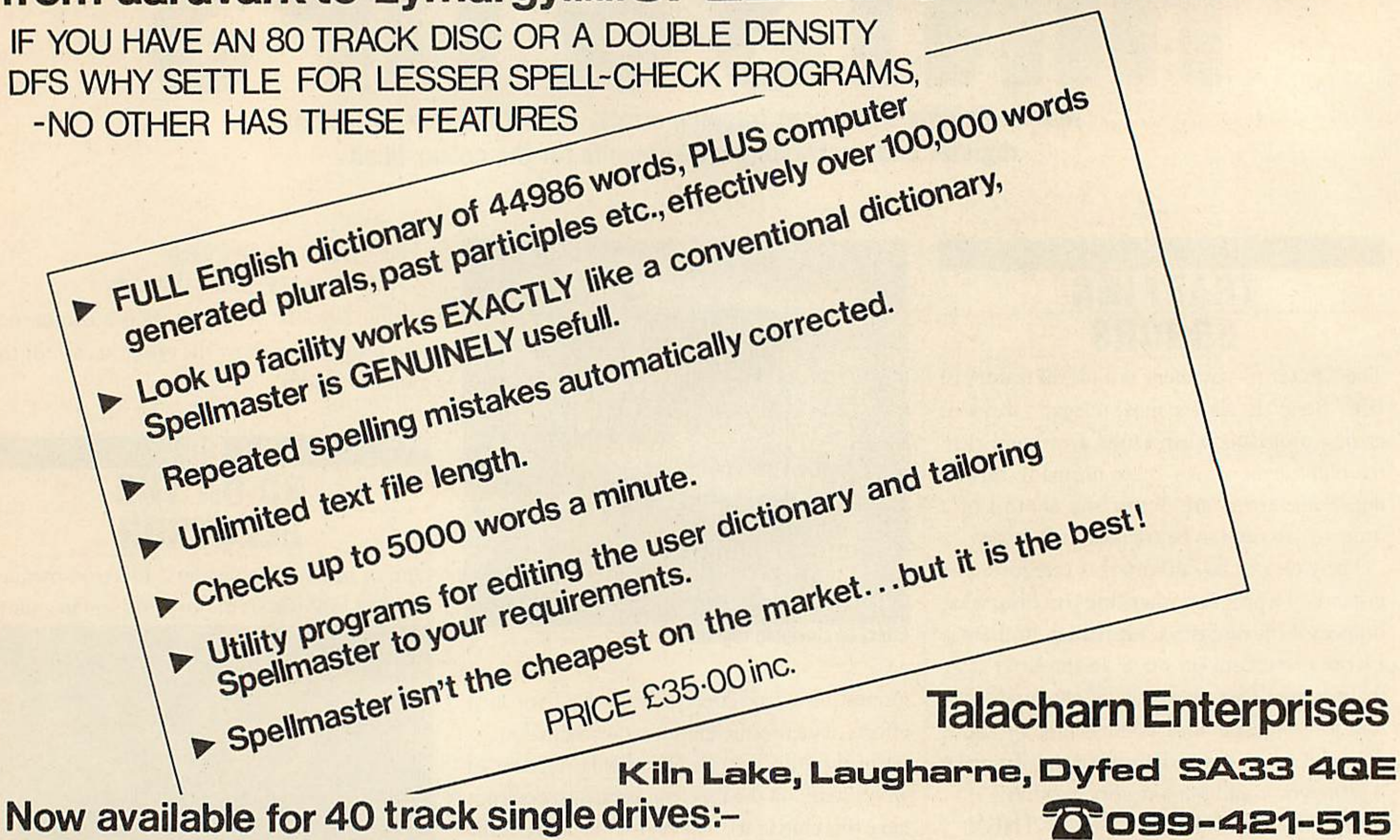
Cylinder is many-sided regular 3D shape

program (listing 3) to display 3D shapes – he also wins £5. He started off with a simple routine to display a polygon, and adapted it to show 3D shapes for his young daughter. This is quite an interesting display which also shows that a cylinder is a many-sided regular 3D shape. Bernard, like several readers who send in their programs, apologises for the not-so-good programming style – the most important thing is for the program to work correctly, style comes later! Mr Emblem's program works well and his style is fine: I found his program very easy to follow, and that's what counts. The program first selects mode 4, a blue background colour and turns the cursor off (lines 60-80). 'sx' and 'sy' are the X and Y screen co-ordinate start points.

On a point of style one could argue that these should be called 'Xstart' and 'Ystart', or even 'X_start' and 'Y_start', but as these variables are called up 18 times, this involves quite a lot of extra typing, and does not greatly increase readability (also, I dislike the use of the underline character, as it is too easily mistaken for the minus sign). Then there is a FOR. . .NEXT loop to draw from three-sided to 50-sided 3D polygons. Three procedures are used: PROCpolygon draws the appropriate

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polygon, PROCjoin draws the lines to join the vertices of each polygon, and PROCcalc which does the clever maths calculation.

Lines 160-180 are a short routine to print a message on the screen, clear the keyboard buffer, and wait until the space bar has been pressed. Those not familiar with the action of *FX21,0 could try leaving this line out, and press the space bar repeatedly when the program is running.

ELECTRON NOTES

In response to my request for Electron owners to stand up and make themselves heard, several Electron owners have expressed a fear that the Electron will be forgotten now the BBC Master is available.

There is no intention of *Acorn User* forgetting the Electron owners; indeed, I am currently preparing some articles specifically for the Electron for the very near future.

From time to time I get requests from pupils doing computer studies projects who need information about a particular topic, and usually expect a full answer by return of post. One recent request would have involved several days work to provide a full reply, even if it were possible to get all the information! The reader wanted technical drawings of a variety of devices, circuit diagrams, technical specifications, as well as comparisons with other similar makes!

Interesting points raised may be covered in Hints and Tips, but usually such an answer would take at least three months to publish.

W J Bramley wrote in asking for help with a commercial program he was trying to run on his Electron with Plus 1. Again, I am sorry not to be able to provide an answer as a problem like this, where the program doesn't work properly, should be taken up with the software house concerned. This is especially so as the program is highly protected, making it impossible to list and then change it.

AVOIDING THE SMALL PRINT

The first quickie comes from E M Ayoubkhan in South Africa. One simple way of avoiding typing mistakes is to use an enlarging photocopier (if one is available) so large copies can be made of the listing, which greatly simplifies entering the program.

If a photocopier is available but with no enlargement facility, then using a copy to enter a listing can still prevent errors as a single sheet lies flat at the side of the machine, and each line can be crossed off as it is entered.

To find how long a program is with all the variables, type the following:

```
DIM P% -1
PRINT P% - PAGE
```

P% gives the next free location in memory. Note that this should be done after the program has run so you can find how much space has been allowed for variables.

ARE YOU SITTING COMFORTABLY?

When people talk to me about their experiences with computers, a frequent comment is that they find it tiring to look at the computer screen for long. The reasons for this are often quite simple: the users do not consider carefully enough the siting of the computer and the screen. Do you find using the computer tiring? Here is a checklist of good practice which can help reduce strain.

- Have the computer at the right height to operate the keyboard easily. Putting the computer on too high or too low a table can easily lead to strain on the back and the shoulders.
- If you can afford it, buy a good quality monitor, medium resolution if possible. A monitor gives a far better quality picture than a TV, and there is far less flicker.
- The siting of the VDU is most important: position it above and behind the level of the keyboard. Having the VDU to one side of the keyboard is a sure way of getting a stiff neck. Ideally the centre of the screen should be level with your eyes when you're sitting at the keyboard. Don't sit too close to the VDU screen as this is often when screen flicker is most noticeable.
- Position the computer system so that there are no reflections from windows or lights visible in the screen. This is perhaps the commonest cause of eyestrain when using a computer, and is sometimes the most difficult to avoid.
- Adjust the VDU so that you've got the best possible picture. It's amazing what some people will put up with and seemingly never notice! Have the brightness turned up enough so that reflections are not easy to see, unless of course, you happen to like looking at yourself.
- Keep the VDU screen clean: the amount of dust which collects on a screen is quite astonishing. If you have the habit of pointing at the screen, a single session of using the computer can cover the screen with grubby finger marks.
- If your computer set-up is kept in one room and you are using it a lot, do consider extra lighting. After experimenting to find an ideal place to site them, I have a couple of spotlights on the wall behind the monitor, so the glare is not visible in the screen but they light up the keyboard and any notes I have.
- Try to keep other equipment such as disc drives or printers within reach. It's very annoying having to lean over to put a disc in or to get a printout.
- A printer stand makes little difference to the problem of eyestrain, but it does allow the printer paper to be kept with the printer and saves the chore of having to stand over the printer to make sure the paper feeds into it correctly.

Most of the computer tables offered in the furniture shops these days are a bit of a joke. They are anything but suitable for the BBC micro. There is seldom enough depth, so the monitor is usually almost level with the front of the keyboard, perched perilously on the edge of a narrow shelf. To reach the keyboard one is almost touching the monitor. You can easily build monitor and printer stands from veneered chipboard, and they are well worth the effort.

JARGON BOX

VDU Visual Display Unit, ie, a television or monitor used to display the visual output from the computer.
Monitor A VDU similar to a TV but with no tuner, and usually with separate colour signal inputs. Often monitors have better quality picture tubes than TVs.
6845 CRTC This is a chip inside the BBC micro which handles all the complex graphics for the screen display. The Electron does not use this chip.
Write-protect sticker This is a small sticker that covers a notch in the side of a disc to prevent accidental erasure or altering of the data on a disc.

COLOUR BLIND CONTRASTS

Quite a few readers responded to the colour contrast test request in Hints and Tips, February '86. It was especially pleasing to have a number of letters from people who are colour blind: there were 19 results sheets returned,

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FLEET STREET EDITOR

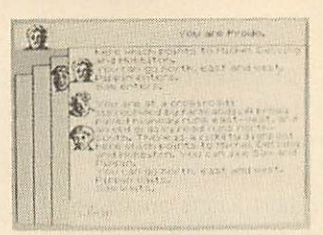
"The supplied graphics, the ease with which layouts can be put together and the ease with which effects can be applied to text mean that this is an all-round success ... an invaluable release for print-minded BBC users." (A&B Computing 03/86) "If you have the proper combination of imagination and a little business sense, the package certainly offers a way of making money with your computer. It certainly makes the most of the BBC micro." (Your Computer 03/86)(Mirrorsoft) BBC B and B+. 2 Disks: no cassette: (State 40 or 80 Track) £39.95

REPLAY ROM

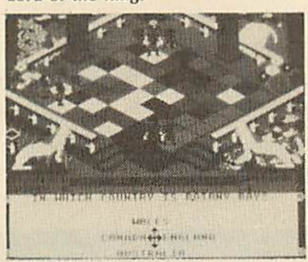
"A magical piece of equipment ... very useful if you can only buy the tape version of a program ... highly recommended." (A&B Computing 12/85) Transfer any program, just about, from tape to disk. State disk system clearly when ordering. (Vine) **REPLAY ROM £35.00**

STUDIO 8

This program contains over 20K of machine-code to convert your Beeb into a 4-voice synthesizer with an 8-track digital recorder with rhythm and drum machine. Comes with 4 music demos. Select any of 32 instruments by name and compose music. (Beebugsoft) **Cassette £17.00 Disk (40/80 Track OK) £22.00**



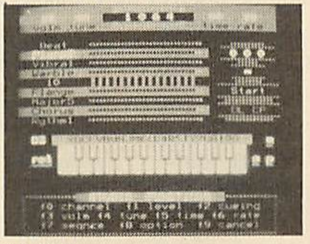
Lord of the Rings



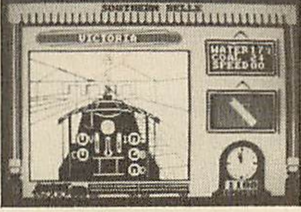
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Mini Office II



Studio 8



Southern Belle



Citadel

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"Steam train fanatics and simulation freaks will love it. The atmosphere is terrific (smell that smoke) and the options mean its got lots of lasting interest." (Amstrad Action 11/85) "Once mastered, it's brilliant. The job becomes very exciting and involved when attempting speed runs ... there's a great deal of skill involved and hardly any luck, a must for simulation lovers." (Crash 11/85) (Hewson) **Cassette £7.95**

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"A game brimming over with originality ... Powerplay's most outstanding features are its high-quality graphics and sound ... comes with over 2000 questions, which should keep the most avid player hooked for some time ... AN OUTSTANDING PIECE OF BBC SOFTWARE." (Personal Computer World 02/86) Powerplay, the Game of the Gods, is by Arcana. 4 skill levels. Acorn Speech Chip makes it talk to you. Input your own questions if you wish. **Disk (40/80 Track OK) £14.95**

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CITADEL

"Everything that 'CASTLE QUEST' was and more and more and more. This game is extremely good ... the graphics are very good. Well worth the cash. " (Computer Gamer 01/86) "Everyone can enjoy Citadel the adventure and will feel the compulsive urge to master this game." (A&B Computing 02/86) Over 100 screens. Sticks OK. No good with Solidisk DFS 2.0. (Superior) **Cassette £9.95 Disk (State 40 or 80 Track) £11.95**

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(S. Andrews, Portsmouth)

HARRIER

"This game has almost everything. It is a combination of flight simulator, shoot em and strategy games ... this will not convert you if you don't like flight simulations, but if you do, buy it." (Micro User 02/86) "A classy, polished and highly addictive simulation, this is a game to keep." (Computer & Video Games 02/86) Choose either Practice or Combat with 3 skill levels. 30 command keys. 28-page manual. No Stick. (Mirrorsoft) **Cassette £9.95 Disk (40/80 Track OK) £12.95**

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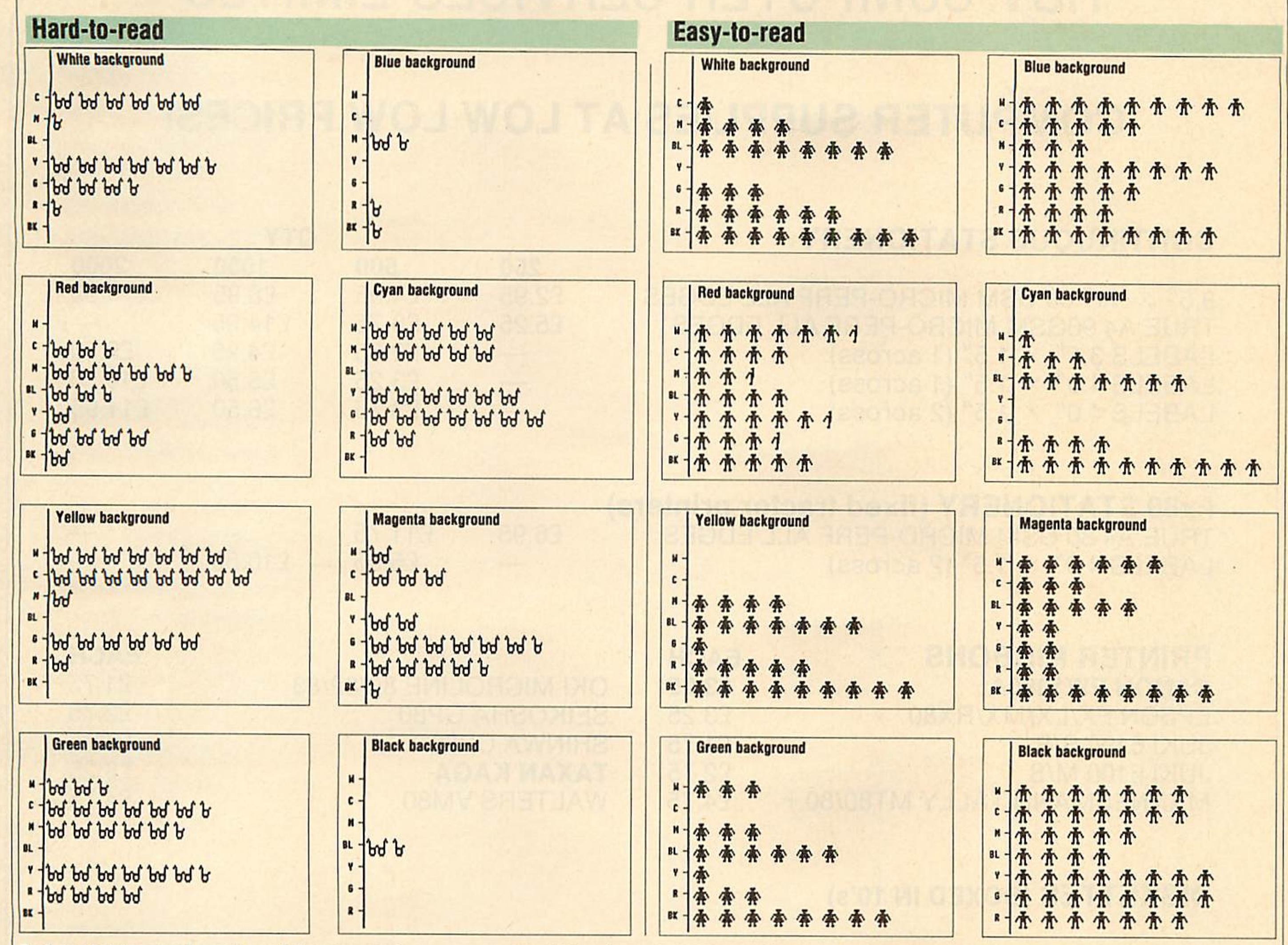
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	Total Order	



Each symbol (spectacles and people) represents two responses. The letters down the left-hand side show the foreground colour

with eight from people who are colour blind. What proved most useful was that two of these people also sent in results from the rest of their family, so it was possible to get some idea of the effect of the VDU used against actual colour blind problems.

As a statistical sample, the data is obviously quite small and has been carried out under far from ideal experimental conditions. Also, it would have been interesting to hear from a totally colour blind reader, but such colour blindness is quite rare. Nevertheless some useful results are quite evident.

First, it is very difficult to spot responses from colour blind people from the rest of the returns. Therefore, this doesn't seem to be a great handicap, and none of the colour blind readers mentioned having any problems, which is good news.

Second, a much greater effect seems to have been caused by the type of VDU used. R M Blackall sent several results sheets in, each using a different type of monitor even going to the trouble of balancing individual colour levels on the RGB signal. This, he found, overcame most of his difficulties. This is something I must confess I have never considered, but I'll investigate and report back in the near future. Thank you, Mr Blackall, for this useful idea.

I have entered all the data into a database and produced graphs of the results. As space doesn't allow all the graphs to be shown at once, and because of the subjective nature of the test, I have included only the 'easy to read' and the 'difficult to read' results. The pictograms show all the 'difficult to read' and 'easy to read' colours. A symbol for glasses has been used for the 'difficult to read' graphs, with symbols representing people for the 'easy to read' ones. Each graph represents one background colour, with the foreground colours displayed as the symbols. To simplify entry into the database, the initial letters for each colour only were entered, so BK represents black, R is red, G is green, Y is yellow, BL is blue, M is magenta, C is cyan and W is white.

From these graphs a few rules can then be drawn up:

- Green, magenta and cyan do not make good background colours if a variety of foreground colours are to be used.
- Where a variety of foreground colours are wanted good background colours seem to be black and blue. Black is the clear favourite, except when using blue text.
- Red is suitable for a background colour provided the foreground colours are chosen with care.

These colours are not necessarily aesthetically pleasing: it's left to the program designer to decide which to use.

The database used to produce the graphs is a new educational one for primary schools soon to be published by EARO, called *Junior Find*.

My thanks extend to E Pickering, K Moore, G Westwood, Elizabeth Lawson, Maureen Lawson, John Lawson, William Monkman, David Harper, Peter Withers, Ruth Withers, Rebecca Withers, Steven Withers, N A Griffiths, B J Griffiths and R M Blackall for their help in being able to compile these statistics.

I would still welcome results from other readers, the more the better, so that a statistically better sample can be produced. The test program was published in February's *Acorn User* on page 105.

See yellow page 113 for listings 1 and 2

FIRST BYTE

DIAL 'C' FOR COMMUNICATIONS

It's easy to hook your micro up to the phone lines and start a two-way conversation

Tessie Revivis

Comms is a term that finds its way regularly into this magazine and many others, including the non-specialist computer press. It is shorthand for Communications, but implies the use of a computer which is 'talking' to another computer using the ordinary telephone line.

Although it may sound rather technical it is really very simple to do. In fact you have probably made use of the communicating ability of a computer many times without realising it. For instance bank cash points allow you to insert your cash card into a computer and request your balance. The screen that you are looking at is nothing more than a small computer which is in instant touch with the main computer within the bank.



Micronet: one of the largest bulletin boards

Take a stroll past a travel agency and look through the window. Nine times out of ten you'll see several TV screens displaying colourful text, large characters – many of which may be flashing, just like a mode 7 screen on a Beeb – the travel agent is probably tuned into a much larger computer that has details of all sorts of air and sea travel. Not only can he or she read the information but the required journey can also be booked simply by entering details at the keyboard of the computer – in short it's a two-way affair.

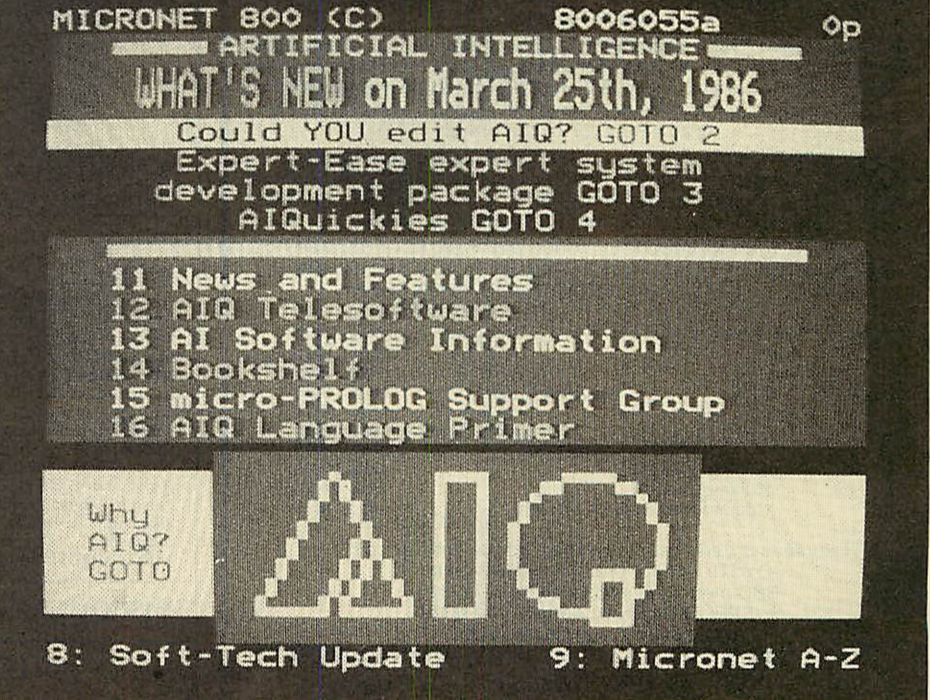
Of course that's just one application, as a hobbyist you open your micro up to other micro users. For example Micronet 800 is one of the largest 'bulletin boards' which you can dial up. A large majority of its 70,000 subscribers are BBC micro/Electron users and during the evenings you can generally 'chat' to many of them; exchanging ideas, getting instant help and advice. Micronet also contains at least one listing from *AU* each month and sometimes two which you can load into your micro across the telephone line! And of course Micronet 800 is just one of the many dial up services that you can access, and some of them offer extremely useful facilities, especially for beginners (see August 1985 issue of *AU* for full details of Micronet and specialist interest groups).

So just how easy is it to hook up your computer to the telephone line? Very easy – in fact in many cases the most difficult aspect is to install a ROM that contains the software you need to communicate with the bulletin board(s) in question. If you're not up to this or want to save your cash then you can use Graham Bartram's software presented in this issue – see page 87.

In addition to your computer you will need a modem. This is usually a small box, about the size of a paperback which connects your computer to the telephone line. The actual connections themselves are very straightforward. The modem connects to an RS423 port on the computer and directly into the telephone plug at the other end.

This raises two points. First, Beeb and Master owners are well endowed with an RS423 port on the rear of the computer so this connection is simple: Electrons on the other hand do not have such a port, but Pace can supply an RS423 port which simply plugs into a cartridge socket on a Plus 1, so unfortunately, Electon owners will need to part with extra cash before they can get going.

The second necessity is a 'new' telephone junction box, if your phone system is relatively new then you probably already have one – they are the type which allow you to unplug your telephone and re-plug it elsewhere. If you have



The majority of Micronet's 70,000 subscribers are BBC micro/Electron users

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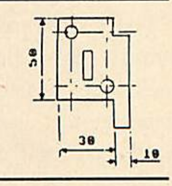
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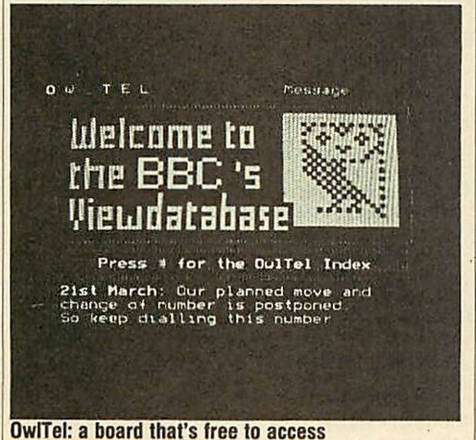
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the old 'fixed' or jack-plug connection then this will need to be changed. Your local telephone office can supply details and costs.

If you do not wish to have an old telephone socket upgraded then you can take an alternative route – the acoustic coupler. This is a modem which uses an acoustic coupling rather than a direct electrical one. The modem contains space for you to insert the male handset of the telephone into the female shaped coupler. This is not as reliable as the hard wired approach because it relies on the integrity of the mechanical joint – but it does the job more often than not. However make sure that the acoustic coupler you are looking at will accept your telephone handset – there is now a whole host of shapes available.

When you are using the telephone line you will obviously not be able to make normal calls, so it may be worth having a dedicated line wired in. In a business you may have a PABX system installed, and it is not normally possible to go through this to an outside line, so a new dedicated line might be needed.

Modems vary in price – a round up of the most popular ones is provided by Jeff Ashurst on page 136 of this issue of *AU*, but expect to pay between £50 and £130, depending on the facilities available. The more expensive modems have auto dial facilities, which will dial and connect you to the bulletin board you require. While they are quite useful to have, if cash is tight you can dial the number by hand and simply switch the modem on when you hear the high pitched sound of the computer answering your call.



OwlTel: a board that's free to access

The modem you choose should be BABT approved. This means that it has the BT 'seal of approval' and may be plugged into the telephone network.

Many of the cheaper modems do not have the BABT seal and while it is not illegal for these unapproved modems to be sold, it is illegal to use them and you could end up with a hefty fine if you are caught. All BABT approved modems have a sticker on them stating the fact – if in doubt ask.

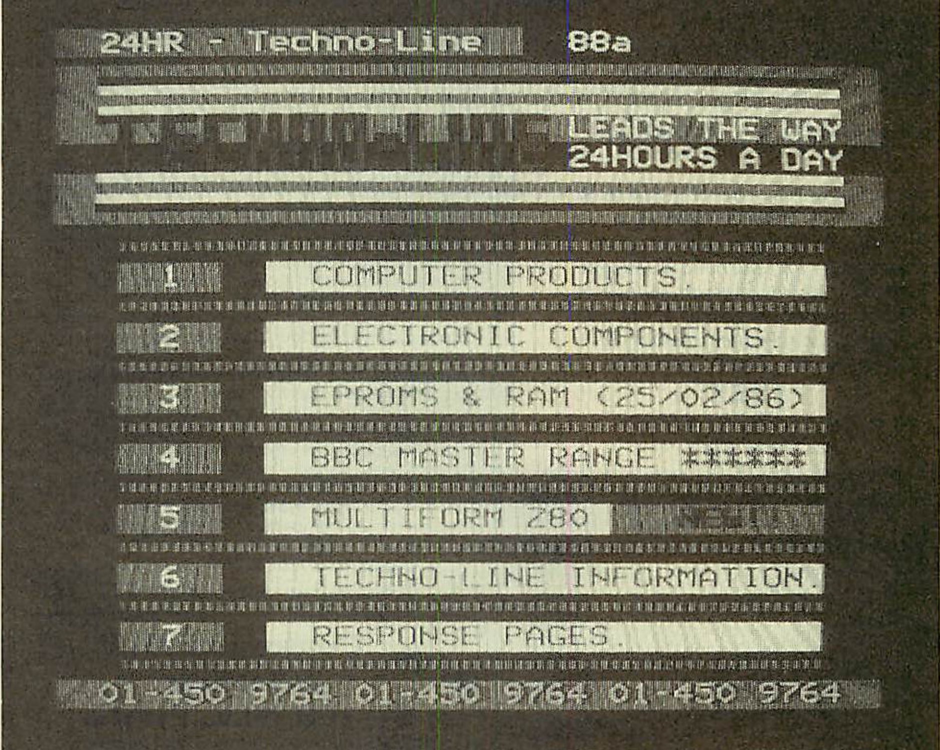
There is a large range of software available to handle the the nitty gritty task of letting your computer talk to another. The majority of it is in chip form and includes popular ROMs such as *Commstar* from Pace and *Termi* from Computer Concepts. Some modems such as GEC's *Datachat* come with software and this may be reflected in the price of the modem.

Like the majority of ROMs these days, Comms ROMs have their own features, and some of these will be more applicable to your needs than others, depending on where your interests lie and what boards you are going to use. Initially I would suggest that you use the software provided on page 87 which will allow you to access the majority of boards. As you gain expertise and come to terms with the jargon and your likely future requirements, you will be better placed to make a decision on the ROM for you. In particular when chatting to other micro users on-line ask them for their experiences and likes.

One of the things to bear in mind when phoning a bulletin board is the rate at which it can send information to you and vice versa – this is termed the baud rate. Typical combinations are 300/300 baud (send and receive at 300 baud) and 75/1200 baud. Make sure that the software and modem of your choice can operate within the ranges you desire. Most will allow all the popular baud rates to be selected, but it is as well to check first.

One factor which puts many people off Comms is the thought of an increased telephone bill. This is not the case. A local cheap rate call will cost you around 40p an hour! The larger boards such as Prestel (which is where Micronet 800 is to be found) are always accessible at local call rates wherever you live in the UK because Prestel-linked computers are available all around the country.

Of course if you dial a board at 9am on a Monday it will run up your phone bill – but if used sensibly it will cost you little extra. Many boards however are not as 'accessible' as Prestel and a user based in Manchester dialling a bulletin board in London, for example, will have to pay long-distance charges.



Technoline offers a 24-hour service which is invaluable to long-distance callers

While many boards are free of charge others levy a subscription – Micronet 800 for example. Currently it is running a good offer which provides a three-month subscription, plus a modem and software for just £49.95 inclusive!

Of course, not all boards charge a subscription. The BBC's Owltel, for instance, is a board that's free to access and David Atherton provides details on page 82.

All in all Comms is really an exciting area of computer use. While it can cost you cash – budget on £100 per year – the benefits it offers such as instant advice, specialist user groups, and lots of good free software more than compensate for the initial outlay. For those of you new to computing the first point is probably most important. For all of you, the message is: 'Comms away, dial today!'

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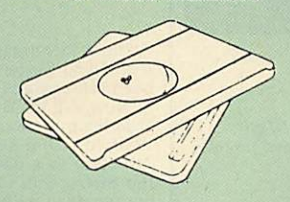
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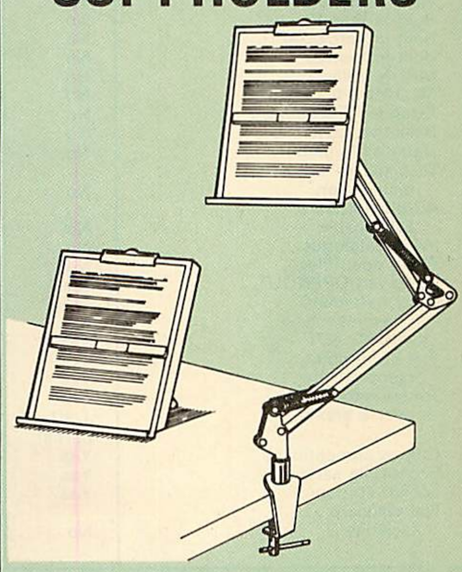
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WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

Just compare the features:

Features	Acorn 1.20	Watford Single Density	Watford Double Density
Max nos. of files per disc side.	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20	1.43	1.53
	partial	Yes	Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£47**
- *Acorn's 0.90 DFS Kit complete* **£47**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

Special DISC UPGRADE OFFER

Acorn/BBC 100K Single Slimline 40 track Disc Drive and Watford's or Acorn's Single Density Standard Disc Interface Kit complete with Utility Disc and Manual.

Only **£99** (carr. £6)
(Offer valid while stocks last)

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.95** Twin (with PSU) **£3.90**

ACORN WINCHESTER DRIVES

Complete with Level 3 File Server Software.

10 Megabyte **£1050.00**
30 Megabyte **£1549.00**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

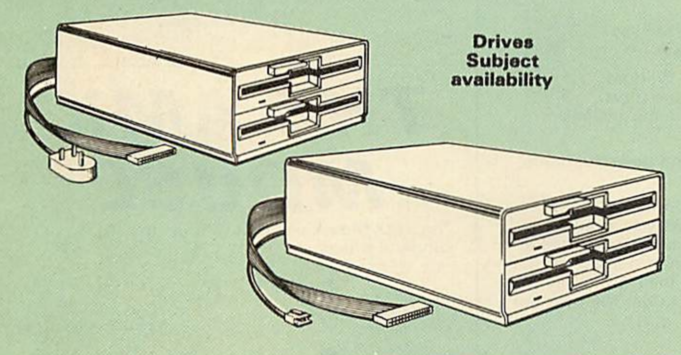
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.



Drives Subject availability

Capacity	Drives without P.S.U. Single	Drives without P.S.U. Twin	Drives with P.S.U. Single	Drives with P.S.U. Twin
100K (180K)	CLS 100 £75		CS 100 £116	
200K (360K)	CLS 200 £102	CLD200 £185	CS 200 £116	CD200 £199
400K (720K)	CLS 400 £104 / £105 CLS400S	CLD 400 £185	CS400 £123 / £124 CS 400S	CD400 £205
800K (1.44M)		CLD800 £194 / £195 CLD 800S		CD800 £218 / £219 CD 800S

● TWIN Disc Drive Case, complete with Power Supply & Cables **£35**
Securicor carriage on Disc Drives £6

Prefix **C** = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix **S** = *40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

All our switchable drives now have a smartly mounted **front panel** 40/80 switch for ease of use.

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£11**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£13**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£19**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£20**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£10**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£12**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£17**

- **3"** *Double Sided Discs* **£4** *each*

This month's STAR OFFER

Buy any two packs of the 3M or our own brand TOP QUALITY DISKETTES and we will give you absolutely FREE – yes absolutely FREE – our 5" Floppy Disc Head Cleaner Kit.
(Offer valid while stocks last)

Special BULK OFFER on 5" DISCS
(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

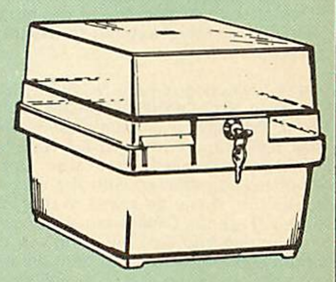
Type	Description	Pack of 20	Pack of 50
M4	Single/Side Double/Density 48TPI	£17	£42
M5	Double/Side Double/Density 48TPI	£21	£56
M7	Double/Side Double/Density 96TPI	£29	£70

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

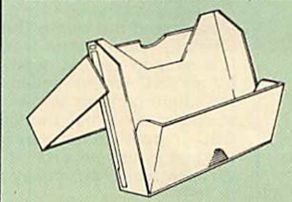
£4

LOCKABLE DISC STORAGE UNITS



Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£11**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£2.00**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00
(Hi-View compatible)

THE NLQ DESIGNER

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40 or 80 track (please specify) disc containing 3 example fonts is included in the package.

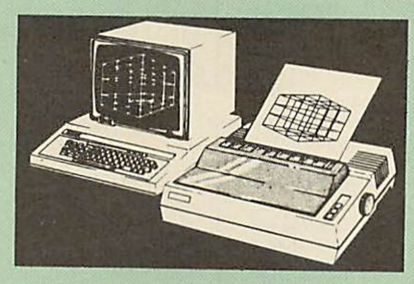
(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

ALL PRICES EXCLUSIVE OF VAT

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

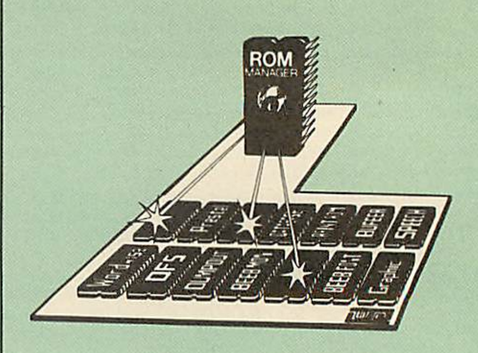
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

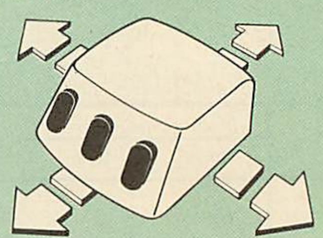
BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65 (carr £1.50)

AMX DESK Package	**£20.00**
AMX UTILITY Package	**£12.00**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

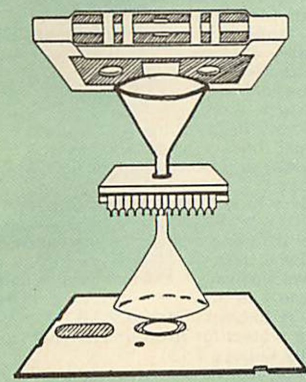
RB12 MARCONI TRACKER BALL

This popular unit is supplied complete with software.

Price: **£50**

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface. Not compatible with 1770 DFS.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

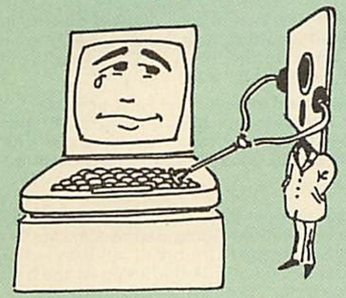
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

All prices exclusive of VAT

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

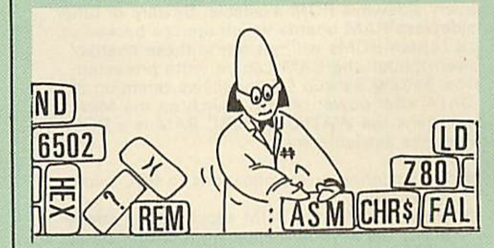
Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!



ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£34**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"



ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.

Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

£24

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued



SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC B+ compatible. Is ideal for use with KAGA KP810 and GLP printers to allow easy swopping of preprogrammed FONT ROMs.

ONLY **£15** (carr £2)

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

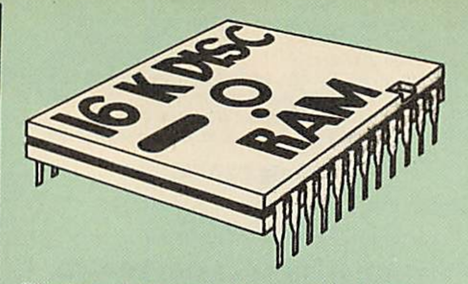
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices exclusive of VAT



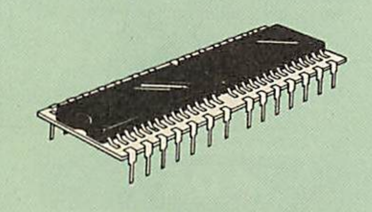
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

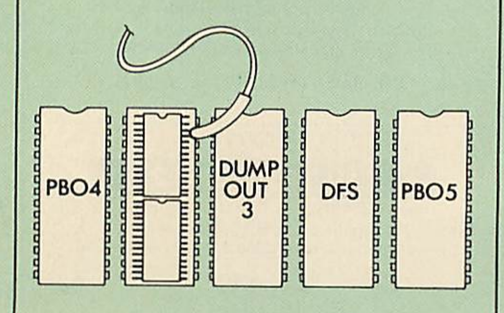
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM





This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

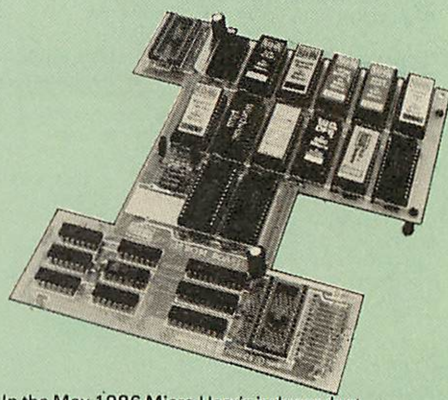
Only **£28** (carr 2)
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find sideways RAM Boards confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.
Do you require:

- Sideways RAM for a BBC B? Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 1.
- A small, basic module? Choose 1.
- A sideways RAM module for a ROM board? Choose 1, 2 or 3.
- An easy to use utilities disc? Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose 2 (3).
- Write protect for RAM (makes ROM look like RAM)? Choose 2 (3).
- Read protect (allows recovery from crashes)? Choose (3).

Key:
1) Solid State 16k Sideways RAM
2) 16k Disc RAM
3) 16k RAM module

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

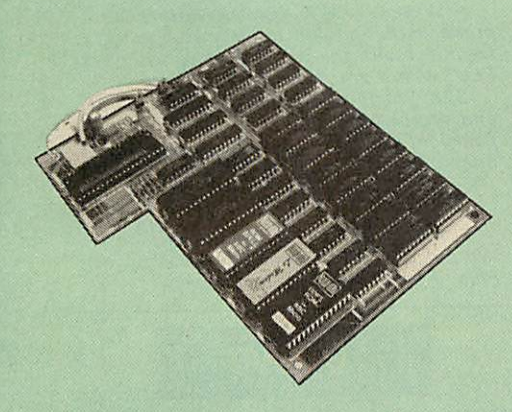
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM* — ***£45***
- *ROM/RAM card with 64k dynamic RAM* — ***£69***
- *ROM/RAM card with a massive 128k dynamic RAM* — ***£109***

(carriage on ROM/RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit* — ***£7***
- *Battery backup* — ***£3***
- *Read and Write protect switches* — ***£2 each***

Complete ROM/RAM board (all options installed) — ***£125***

Le Modem



The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to Micronet and FREE registration to MicroLink to start you up.*
- *BBC Master compatible.*
- *BT Approval applied for.*

Price: **£89** (carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual) (Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£115 (carr £3)

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

ISLAND LOGIC MUSIC SYSTEM only: £25

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42 (carr. £4)

GLENTOP's 3D GRAPHICS

Development System — **£22**

DATAGEM

Now compatible with Watford DFS's

Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 × 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

£59

BT TELEPHONE CONNECTORS

LJU	1/4A Mini Line Master	**£4.50**
LJU	1/6A Mini Line Slave	**£3.00**
LJU	2/4A Line Master	**£4.00**
LJU	2/6A Line Slave	**£2.50**
LJU	3/4A Flush Master	**£3.95**
LJU	3/6A Flush Slave	**£2.75**
LJU	10/3A Dual Splitter	**£5.50**
	4 Way BT Plug	**£0.75**

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →



COMPUTER CONCEPT'S ROMS

ACCELERATOR	£51
CARETAKER Basic Utility	£27
Graphics ROM	£25
Disc Doctor ROM	£25
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£26

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: £28

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£40

INTER CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

ONLY: £26

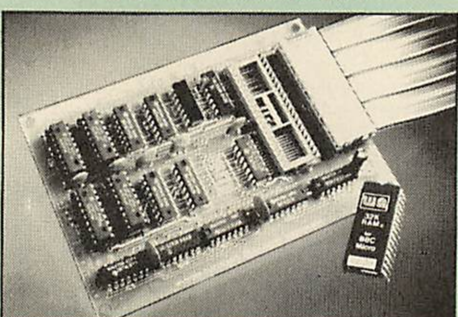
All Prices Exclusive of VAT

GRAPH PAD

With this popular Mk II British Micro's Graph Pad, you can add new dimensions to your computer enjoyment. It helps you to create your own applications programs by the simple use of the Graphpad. Ideal for educational use. Supplied complete with cables, Manual and Software Cassette.

Special Offer £51 (carr £3)

32K
SHADOW RAM-Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.

- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.

- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £75 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£39**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£38

VIEWSHEET (Acornsoft) £39

VIEWSTORE £39

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

OMNIREADER

OCR at a price you can now afford

The manually operated omnireader is preprogrammed to read 4 common type faces – including: KAGA Courier 10, Courier 12, Letter gothic & Prestige Elite. It reads a line of text in about 3 seconds & is ideal for inputting already typed material into wordprocessor packages, such as View or WW, Databases or Spreadsheets. Comes complete with power supply, instruction manual, longrule & Dustcover. Also available on disc for the BBC is a utility program which merges input from the service port with the keyboard thus allowing full editing control whilst using the omnireader. Also included is a Basic program which displays the pixel map image obtained from the omnireader – ideal for doing your own OCR.

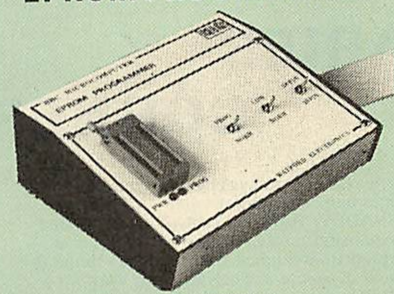
(As seen on the TV programme Micro LIVE)

Price: **£175**

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Language Subroutines	£19.95
6502 Development System	£7.50
68000 Assembly Lang. Programming	£19.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£14.95
Advanced BASIC ROM User Guide	£9.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£13.50
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Advanced Programming Techniques for the BBC Micro	£8.95
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic Programming on the BBC Micro	£6.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B+ User Guide	£14.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Machine Code Portfolio	£7.95
BBC Micro add on guide	£7.95
BBC Micro Advanced Reference Guide	£10.95
BBC Micro Advanced Programming	£9.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
BBC User Guide	£10.00
BBC Wargaming	£8.95
BCPL User Guide	£14
Business Applications on BBC	£7.95
Complete FORTH	£6.95
CP/M - 86 User's Guide	£19.95
CP/M Bible	£16.00
CP/M Handbook with MPM	£9.95
CP/M Plus Handbook	£13.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£9.95
Discovering BBC Micro Machine Code	£6.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
Filing System & Databases for the BBC Micro	£7.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Play	£6.95
Graphics for Children	£6.95
Graphs & Charts on BBC Micro	£7.50
Guide to BBC ROM	£9.95
Hackers Handbook	£4.95
Hackers Handbook - New	£6.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing & Robotics on BBC	£15.95
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing CP/M on the BBC Micro Z80 2nd Processor	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO-PASCAL Reference Manual	£9.95
Let your BBC teach u to program	£5.45
LISP 2nd Edition	£14.95
LISP, A Beginners Guide to	£10.95
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£17.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.95
Master Reference Manual Part 2	£14.95
Micronet Handbook	£6.95
Programming the 6502	£16.95
Programming the BBC micro	£6.95
Programming the Z80	£19.95
Sencing & Control Projects for BBC	£5.95
S-PASCAL on BBC Micro	£7.50
Structured Basic	£7.95
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View Guide	£4.50
Viewsheet User Guide	£10
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£7.45
Wordwise Plus Guide	£9.95
Z80 Assembly Language Programming	£19.95

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

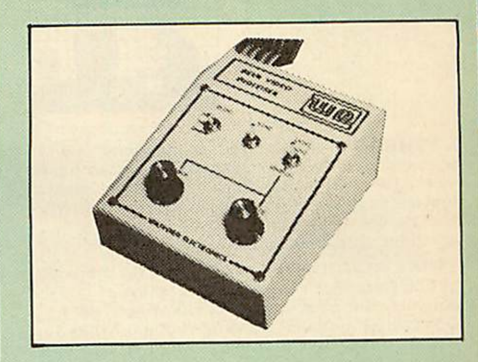
SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£110 (Carr. £3)

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

Continued


OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock value, current gross margin, cost of bringing stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21**

(Cassette or Disc)

For fuller description on any of the software titles on this page, please refer to Gemini's own advert in this publication.

Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

L.B.O. Rom

Life & Business Organiser

– the ULTIMATE BBC utility!

Features include:

- Automatic reminder of entries overdue for attention.
- One week's advance notice of forthcoming events.
- Urgent notice board.
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day.
- Month AND week's summary at a glance, indicating time booked and free.
- Single entry of a RANGE of events and updating of regular happenings.
- Super search facility to call any event by any related word or part word.
- Month by month preview of all forthcoming events.
- Built-in intelligent calendar.
- All data saved to disk.
- Full printer support.
- Easy to follow documentation.

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

Price only: £17

(Also available on DISK)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS
- WORD PROCESSOR

Database – Set up a computerised "card index" system and add record/data to the file your way. Features include search, sort, mathematical calculations, printer routines, data summaries, etc.

SPREADSHEET – Offers a wide range of invaluable calculation and editing features. Beebplot will take files created by Beebcalc to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT – Provides an easily assimilated visual representation of numerical data.

WORDPROCESSOR – Provides many routines found in large and expensive packages.

OFFICE MATE Only £10

(Cassette or Disc)

ARIES CORNER

Aries Computers was the first company to commercially market what is now known as SHADOW RAM. As part of it's continued expansion policy, Watford Electronics is proud to announce that the Aries range is now available exclusively from Watford Electronics and their dealers.

The Aries range, designed by experts offers you the solution to your upgrade nightmares. All the Aries products are compatible with double density disc controllers, modems, second processors, ECONET, hard discs, EPROM programmers and of course, other members of the Aries family and most of the much wider Watford family (some products advertised here perform identical functions and hence cannot be used together). Several major companies now test all their products to ensure compatibility with the Aries B20 & B32.

In quality of construction, the Aries range sits alongside the Watford range in setting a standard against which others are judged. Custom made connectors eliminate the damage to the BBC machine caused by inferior products.

The Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20; the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many othr applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) sofket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM our advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

THE ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 – BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 – BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£16
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc/Tape	£7

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£9.50**

Replacement FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£13** (£2 carr.)

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

SPARES for BBC Micro

Keyboard	£46;	Keystrip	£2
Power Supply	£45;	Case	£25
UHF Modulator	£4;	Speaker	£2
Speaker Grill	£1;	Keyswitch	£2

8way DIP SWITCH **£0.85**

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug

to 5 pin DIN Plug + 1 Jack Plug	£2.00
to 3 pin DIN Plug + 1 Jack Plug	£2.00
to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50

DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234/33383

النور

ARABIC ROM for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

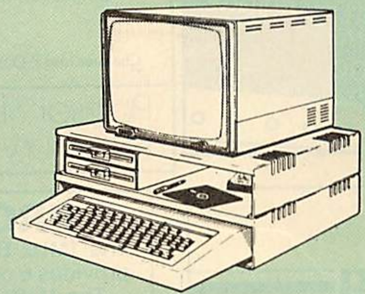
20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

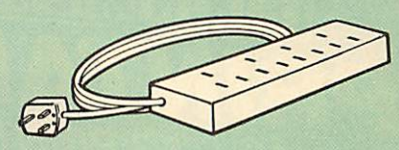
PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.50 (carr £1.50)

ACORN MUSIC 500

The Acorn Music 500 System is probably the most powerful piece of music generating hardware available for the BBC Micro.

£72 *(carr £4)*

28 pin ZIF SOCKET (Textool) **£6.95**

28pin DIL HEADER PLUG

SOLDER type	£1.50
IDC CRIMP type	£1.95

RIBBON CABLE

28way **55p/ft;** 34way **60p/ft.**

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Soldering Iron (Antex 17 Watt), Ideal for electronics PCB work	£6
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6264LP-8K RAM	£3.75
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ACORN BASIC 2	£16
ACORN ADFS	£25
ACORN DNFS	£17
Acorn OS 1.2	£6
Acorn BCPL	£42
Basic Editor	£25
Acorn COMAL	£36
Acorn FORTH	£32
Acorn Graphics	£25
Acorn LISP	£35
Acorn LOGO	£42
ISO Pascal	£42
ICON Master	£28
Logotron LOGO	£55
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Microtext ROM	£48
ROMIT	£29
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TERMULATOR	£25
MUROM	£21
SLEUTH ROM	£24
STUDIO 8 Disc	£18
Toolkit Plus	£31

ACORN'S GRAPHICS EXTENSION ROM
GXR-B £21.00 GXR-B+ £22.00

Prices subject to change without notice and available on request. All offers subject to avalibility.

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APRIL 6th 1986

The New Financial Year

Were you ready? Have you got a good comprehensive Payroll program for your computer? Micro-Aid were the first company by over a year to offer suitable payroll programs to you. Now we offer a version that can be used on the Electron, BBC B, BBC B+, BBC B+128, and now for the BBC Master Series. We also have one for those traitors who use the Amstrad CPC range!

Our Basic Payroll comes in either Weekly or Monthy versions and costs just £29.95 and the Extended Disc version which covers just about everything on one disc costs £49.95 + VAT.

If you want to enter between 1 and 400 employees with full pay details and a further 19 items of personnel data with three overtime rates, flexible hourly, weekly, fortnightly, four weekly or monthly rates and contracted in or out options then look no further. We also offer space to enter SSP, other Sick Pay, Holiday Pay, Pre-tax and Post-tax adjustments. You can advance the pay period for holiday pay or pay in arrears if needed. We offer you two different types of payslip at the touch of a button, either vertical plain paper or horizontal twin NCR payslips. You also get a current pay period summary, employee summary, tax period summary and to finish off a coin analysis.

We don't leave you on your own once we have your money, if you have taken out our annual Update Contract for just £7.50 + VAT we will let you know about the government tax and NI changes as required which are easily implemented and you can also ring us at any time for program maintenance advice.

Order now and enclose a copy of this ad before 6th April 1986 and gain an annual contract FREE. Don't delay – it's costing you money.

OUR ACCOUNTS & MAILING PROGRAMS AT £29.95 + VAT AREN'T BAD EITHER

Micro-Aid

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AA122



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FREE LIBRARY BOX WITH 10'S
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DEMON modem

NOW AVAILABLE AT ONE HELL OF A PACKAGE PRICE FOR THE BBC MODEL B MODEM + BBC ROM

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AA126

DEVILISHLY CLEVER FEATURES

Auto Answer
The Demon answers, then unloads or downloads data into your micro and printer just like a telex.

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Numbers dialled by the micro. Doesn't even need a telephone attached.

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The dial disk allows you to set your favourite numbers and keeps dialling until you are connected.

Full UK, European & USA
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Baud Rates
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Bulletin Board Facility
Start your own contact information boards throughout the world.

PSS
Packet Switching Service lets you dial worldwide databases for the cost of a local call.

Complete with Plugs + Leads
For telephone, BBC 5 pin DIN RS423 and mains power supply.



EASY TO USE?
You don't need to know anything about baud rates or protocol or 'handshaking' simply plug it in and talk to the world.

Direct from the Manufacturer
By selling it directly we are able to offer it at this low price and still give you support should you need it.
We also have complete control of the quality and build it to the same standards as the products we supply to BT and whilst this modem is not yet BT approved the components we use are.
We also offer a money back guarantee now extended to 12 months for registered users.
PROHIBITED from direct or indirect connection to public telecommunication systems. Action may be taken against anyone so connecting the apparatus.

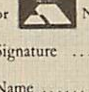


To: Walkbury Consultants, (Modem Dept 1), Unit 1, Alfric Square, Woodston Industrial Estate, Peterborough PE2 0JA. Tel: Peterborough (0733) 235187.

Please send me:

.....(Qty) Demon Modems plus Demon BBC Rom at (£94.95)
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I enclose a cheque to the value of £ ......

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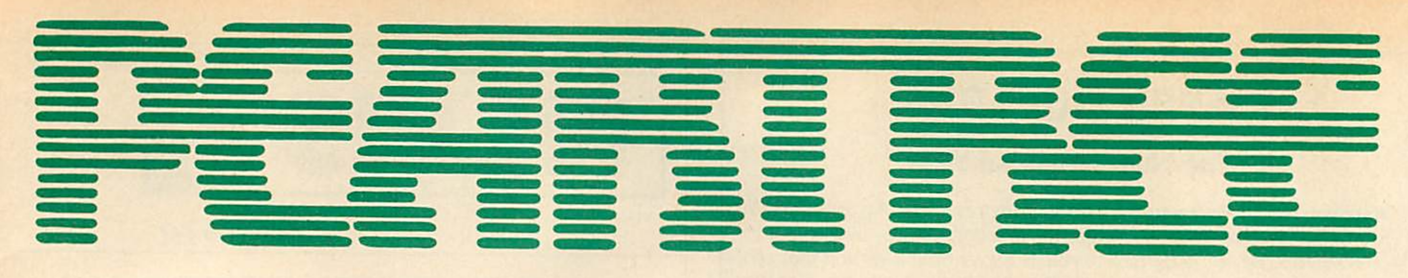
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AUTHORISED ACORN DEALER



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AMB15 BBC MASTER 128 — **£435.00**
* 128K
* Complete with View, Viewsheet, A Basic editor, Termulator, ADFS, 1770 DFS and Basic
* Battery backed up RAM
* Two ROM cartridge sockets
* Numeric keypad

ANB55 BBC B+ 128K — **£385.00**
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* Sideways RAM
* 1770 DFS

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* 32K
* Radiation screened case

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* 4MHZ
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* Hi-Editor
* Printer buffer software

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ANB28 1770 DFS UPGRADE FOR BBC B — **£39.00**
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* Will take ADFS for double density

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* For BBC B with 1770 DFS kit
* Double density
* Hierarchal filing structure

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* Sideways RAM

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* 32 bit processor
* Complete with Fortran, Iso-Pascal, Cambridge Lisp, Panos, C, BBC Basic & 32016 Assembler
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* Complete with 64K Hi-Basic
* Compatible with B, B+ and Master

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ECONET

AMB12 BBC MASTER ET 128K — **£348.00**
* No DFS
* Econet station
* 128K memory

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* In monitor bridge (Master size)
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* 180 CPS
* IBM compatible
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* Downloadable characters
* 24 pin head

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* NLQ mode
* Centronics interface

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* 160 CPS
* Downloadable character set
* Centronics interface

EPSON FX105 — **£499.00**
* As above with wide carriage

EPSON FX85 TRACTOR FEED — **£37.00**

EPSON LQ800 — **£595.00**
* 24 pin head
* 180 CPS
* Excellent near letter quality

EPSON LQ1000 — **£795.00**
* Wide carriage version of above

KAGA TAXAN KP810 — **£229.00**
* Low cost NLQ printer
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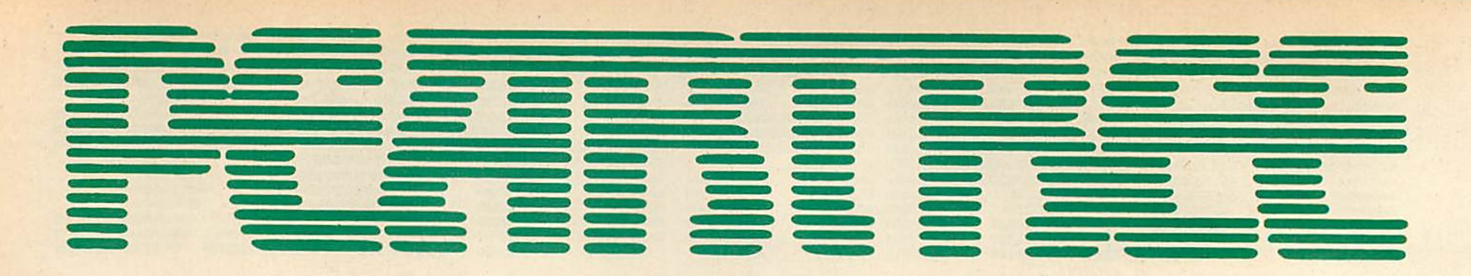
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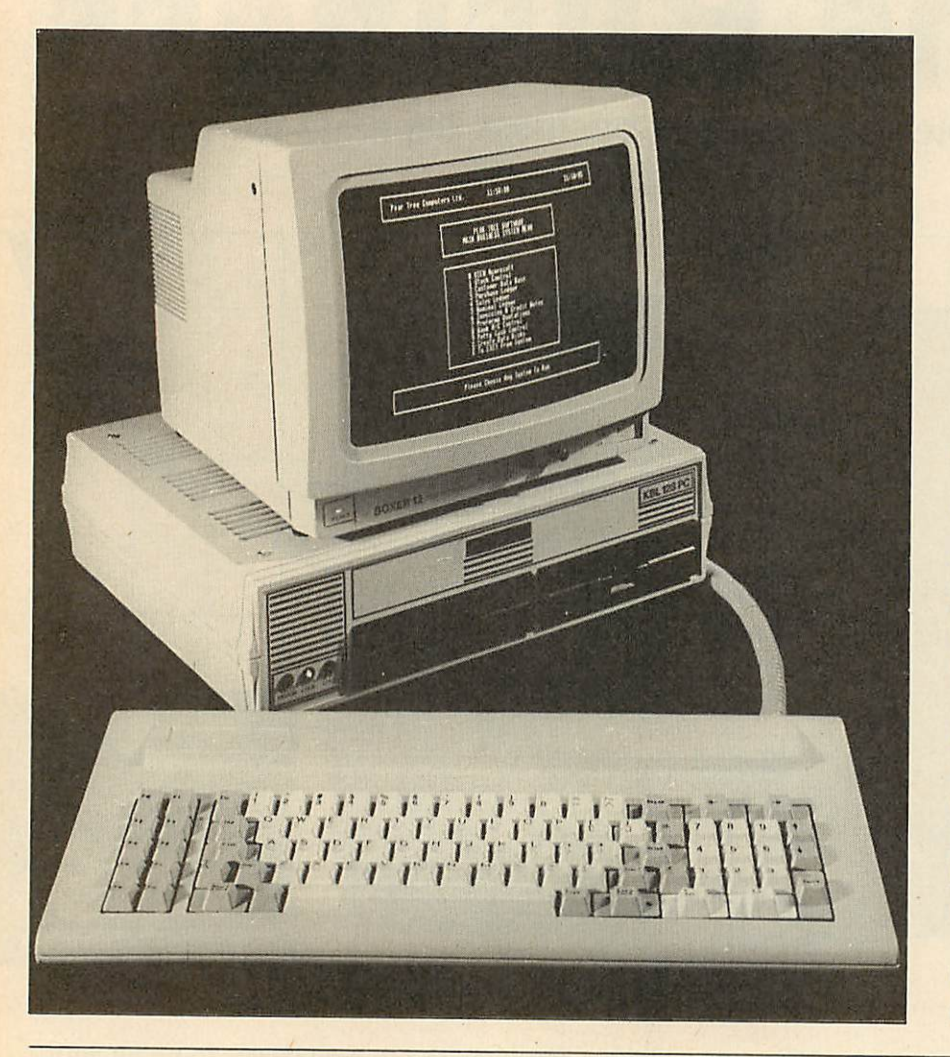
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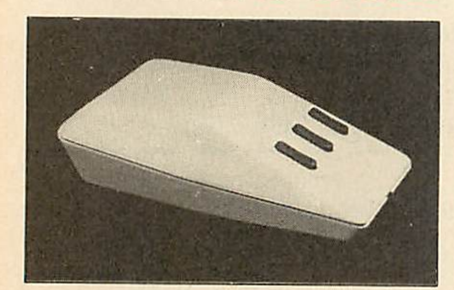
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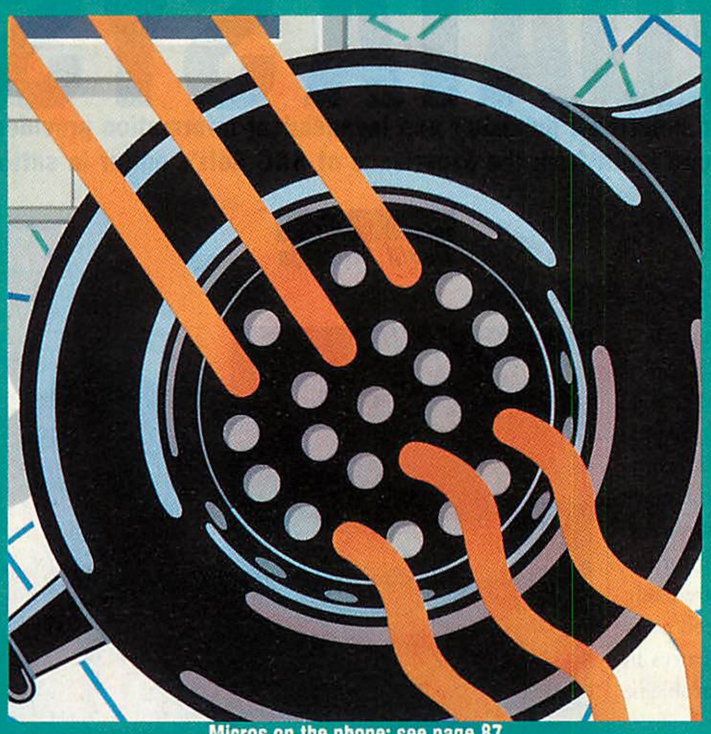
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ACORN USER


Micros on the phone: see page 87

GUIDE TO COMMUNICATIONS

SET UP YOUR OWN VIEWDATA SYSTEM

If you want to become an electronic publisher and independent information provider using a Beeb and the Communitel package, you can learn from the experience of BBC Soft's editor in setting up the OwlTel service

David Atherton

The pros and cons of setting up a bulletin board were discussed by Tony Dennis in *AU* Aug '85. In this article, I'll be looking at setting up a dial-up viewdata system. A viewdata is technically similar to a bulletin board but there are fundamental differences, such as why you would set one up, how you design the information on it, and the type of caller you are likely to get. I run a viewdata system for Beeb users called OwlTel. I'll describe my experiences in setting it up to highlight some of the problems (and fun!) that you may encounter.

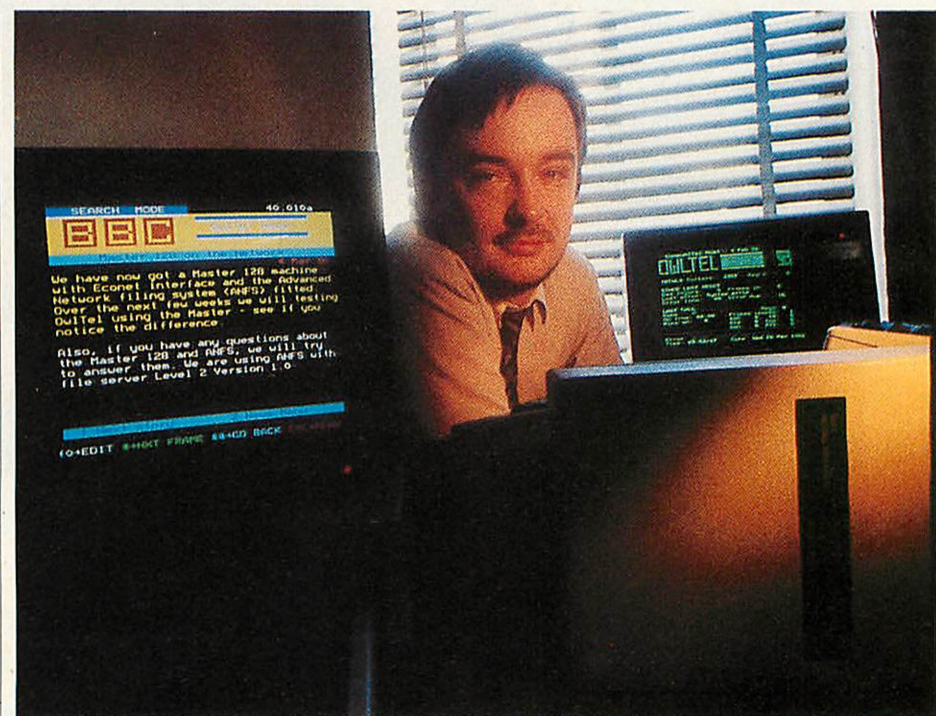
I decided to set up the system because I wanted to provide an interesting service for BBC micro users. Less altruistically, I work for BBC Soft, and I wished to promote our software. The system can take credit card orders for any BBC Publications product.

At the outset, I thought more people would want to read information from the system than write to it. Therefore a 1200/75 baud (bits per second) rate (fast reading, slow writing) was preferable to the other popular standard, 300/300 baud.



The OwlTel menu page to see to send messages

It was also important for the system to be accessible to as many people as possible. A lot of cheap 1200/75 baud modems with viewdata software have appeared recently and, unlike other systems, viewdata is a clearly defined standard. Altogether a 1200/75 viewdata system seemed the best bet. Finally, viewdata is easy to use. This was important because, unlike a hacker's bulletin board, I expected to receive calls from inexperienced users.



David Atherton at the centre of his system for the BBC micro, OwlTel, set up using the Communitel package

MAIN PHOTOGRAPH BY CHRIS MOYSE

Installation

Having decided to go for viewdata, the choice of a system was easy. The Communitel system came as a complete ready-to-go package, and had been around for a couple of years, so most of the bugs had been fixed. Within a week of placing an order, a large box containing modem, software, manuals and cables arrived.

What didn't arrive immediately was an extra telephone line to allow 24-hour operation of the system. Though I'd booked this a few weeks before, I had to start with my regular phone line.

Plugging in the system and installing the software took about 30 minutes. Another 20 minutes produced half a dozen sample frames, (yes – the frame editor is that simple to use!) and a phone call to a friend who owned a modem confirmed that everything worked.

So far so good – the next step was to create a real database. Easy enough I thought, and picked up a pile of BBC Soft manuals, intending quickly to write a frame for each one.

Well, it proved a bit harder than I thought, but three long hard days and nights later I had prepared and routed about 120 frames. It's not just a matter of transferring information to the system. The information needs to be concise to fit in the 23 × 40 character area of each frame, and links to other frames containing connected material have to be planned in advance. Also, menus and sub-menus must be prepared.

The best approach is a tree-like structure with major information areas at the end of the branches. These areas must all be linked or

'routed' from the opening page, so there can't be more than ten routes. Limit yourself to eight main routes, so that two routes, typically 0 and 9, can be reserved for special purposes. On my system, 0 always returns you to the front menu, and 9 is reserved for a quick tour round the database.

Further submenus should stick to a strict form of numbering. On OwlTel the help menu is on route 8 from the front page and is numbered page 8a. The 'new users' information is on route 1 from the help menu, and so is numbered page 81a, route 2 from the help menu is page 82a and so on (figure 1).

Disciplined frame management will pay you dividends in the long run. For one thing, most other databases use structured formats, and users will be familiar with the layout. Also, a rigid approach makes your own management of the database simpler. For example, when space is tight, old sections may have to be deleted. If you know that a whole section is referenced under pages beginning with 7, just cataloguing the disc will tell you how many frames should be removed, and what their names are.

Page design

It's important to design your pages well. There are guidelines and even courses on this topic available from the ClubSpot 810 section of the Amateur Computer Club (ACC) on Prestel, so I'll confine myself to a few basic rules.

- Never use more than four colours per page (except perhaps in pictures).
- Use contrasting backgrounds. In teletext, black, blue and red are 'dark' colours; white, yellow and cyan are 'light'; green and magenta are 'medium'. The best layouts use light colours on dark backgrounds and vice versa.
- Avoid flashing colours, except for the odd character or dot.
- Put the heading for each frame at the top, and the routings at the bottom. Everyone else does, and callers are used to this layout.

Also, it's a good idea to look at TV Teletext, Prestel and other viewdata systems for page design ideas. Don't just copy them, though!

Eager for callers, I wanted to let people know that my system existed. First, I wrote a press release and sent it to all the computer magazines and educational journals I could think of. I knew that would take a few weeks to get into print, so to start the ball rolling, I left messages on existing bulletin boards. I concentrated on Viewdata boards such as the Gnome at Home, and sent a notice to the Bulletin Board Operators' Association, which also ensures an entry in the ClubSpot list. This list is displayed on Prestel, and circulated by magazines, modem manufacturers, and so on. If you are serious about being a 'sysop' (system operator), then you might like to join the Operators' Association.

Running out of space

The maximum size of a DFS-based Communitel database is only 195 frames, and within a few weeks I was rapidly running out of space. The only solution with this particular software is to install it on an Econet system. On the network, the number of frames possible is only limited by the capacity of the file server. On Econet level 2, this can be as many as 750 frames (1 frame = 1 kilobyte), although, in practice, you'll probably want to keep the operating software on the same network disc; this plus caller log files and directory entries reduces the available space by about 200k (or 200 frames).

There are two other big advantages to using Econet. The first is that you can edit the database without 'taking it down' – you can create and alter pages while the system is waiting for or dealing with a caller. Of course, you need at least two Econet stations to do this – one to deal with callers or 'run the host', one to edit from. The other advantage, which I found interesting, is that background software can be run from another Econet station.

Within the NFS and file server software there are facilities to 'peek' at another station's memory. Coupled with the fact that all stations access the same set of files on the database, this opens up many possibilities for extending the system without altering the original software.

The principle is that software running on a network station can automatically update the database. The first thing I did on these lines was to set up a bulletin board system which immediately inserts callers' messages into the main database. The Communitel software normally places messages received in a special directory ('I' on disc, 'INTRAY' on network) where they stay until the sysop decides to read them. I wrote a program to scan this directory constantly, (using OSGBPB, A=B). When a file is found, ie, a message is left by a caller), the program loads it, adds a note of the time and the caller's name ('peeked' from the host station), and resaves it into a bulletin board area on the main database.

This means that anyone can read the message, including the caller himself as the transfer is almost immediate. I find callers like this facility, and the user-created pages are among the most frequently accessed.

Keeping callers

How do you encourage people to call again? Well, the first priority is to update the database regularly. A good plan is to produce a new article or feature at least once a month. Leave 'teasers' on the board, saying what is 'coming soon'. But beware of promises you can't fulfil.

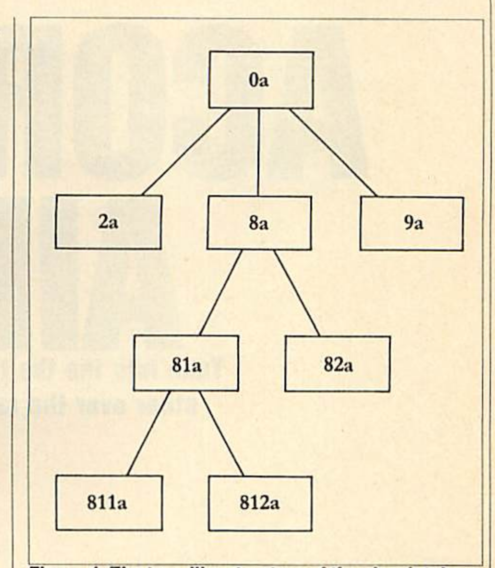


Figure 1. The tree-like structure of the viewdatabase

Another important area is feedback. Even if you don't operate an automatic bulletin board, you should reply to messages from callers. The Communitel software, like most Viewdata systems, allows callers to send messages which are stored as frames. By loading these frames into the editor, and adding your reply or other comments, then resaving the complete frame onto the main database, you can talk to your callers. The sort of messages I get are technical BBC micro and communications questions, requests for other bulletin board (BB) numbers, and the usual chit-chat from BB regulars.

There are also messages about the database itself. Responding to feedback keeps people interested – provided you act on the suggestions. Some people ask for things that aren't technically possible (faster page access) or affordable (more free telesoftware), and then you have to explain why these things can't be done. There may be no immediate gain – after all, nobody is paying you anything for the service; but if you're going to run a database, you might as well do it well.

In a year of running OwlTel, I have probably put in the equivalent of four weeks' full-time work, but naturally it now has a momentum of its own. Whether we've got a lot of business from it is debatable, but it's certainly been fun! If you'd like to see OwlTel for yourself, just connect your modem to 01-927 5820 anytime day or night.

ClubSpot 810, 50 Beatrice Avenue, London SW16 4UN (Page 810 on Prestel).

Bulletin Board Operators Association, PO Box 57, Barnet, Herts EN5 2RS (Prestel Mailbox 013482203).

Communitel, 189 Freston Road, London W10 6TH. Tel: 01-960 7998.

ACORNS ON THE AIRWAVES

Tune into the the latest communications craze – micros talking to each other over the radio airwaves – which will cut your phone bills, too

Tony Dennis

Bulletin boards may currently be all the rage with Beeb owners, but packet radio is set to be the next micro craze. Low-cost host software is becoming available enabling mailboxes (as radio boards are known) to spring up all over the country. When users see their quarterly telephone bills, they will be more than willing to purchase a radio modem – because radio data transmissions are free.

Packet radio is a way of transmitting and receiving data using radio frequencies. Unlike previous methods, such as RTTY (Sept '84) reliable data transmissions can be achieved. Data is sent out in blocks or 'packets' which can be re-sent if the receiving micro detects any corruption. Packets can contain all types of micro data including graphics and machine code, not just ASCII and text.

Packet radio is not the first form of error checking data transmission to be used over the airwaves, but it is faster and more sophisticated than AMTOR – an amateur version of the marine protocol SITOR. AMTOR hardware/software for the BBC micros is already available from companies such as ICS of Arundel for £44.85 including VAT. However, the popularity of AMTOR is bound to suffer since packets can be sent by Beeb users without a modem or interface.

Acorn owners appear to be the most heavily involved in this niche of amateur radio communications. However, packet radio users need to pass amateur radio exams before being able to trasmit as well as receive data. The best way to pass is to contact the Radio Society of Great Britain and obtain one of its publications, eg *The Guide to Amateur Radio* (£3.84) or *How to Pass the Radio Amateur's Exam* (£3.42). The exam is set by the City and Guilds and costs around £18 to take the two papers on one day. An amateur radio licence will set you back £12 a year. Having passed the exams, what equipment is needed? Obviously a good quality radio receiver and transmitter (transceiver for short) is necessary. In some cases, unlike telephone communications, it is possible to dispense with a modem and interface. The RS423 or audio ports of the BBC micro can be used to link directly to the transceiver. An aerial of some sorts will also be required. Prices start at £12 for an indoor beam antenna but good co-axial cable (85p per metre) is also a must. A specialist dealer such as North London Communications sells transceivers from Icom, Yeasu and Standard for £260 to £525.

Unfortunately it is this ease of interfacing the Beeb which could be the undoing of packet radio. The lack of any extra hardware means that several authors have formulated their own versions of packet radio protocols for the BBC micro, so there is no standard. Also, such systems are only viable if both sender and receiver posses identical software. Unless the author converts it for use by other micros, for example a Sinclair Spectrum version, there is little hope of such a protocol being accepted as a common standard.

As usual north America was ahead of the rest of the world in taking up packet radio. In the USA, the Tuscon amateur radio buffs came up with their version of a packet radio protocol known as AX25.

Low-cost host software is becoming available enabling mailboxes to spring up all over the country

The Canadians also have their own protocol, VADCG, which takes its name from the place of origin, Vancouver. If Acorn users adopt either, they will at least be able to contact their American cousins. Obtaining up to the moment information is the big problem. However, there are several organisations willing to help. A good starting point is the Radio Society of Great Britain. It costs £16.50 a year to join and has a well respected journal, *Radio Communications*.

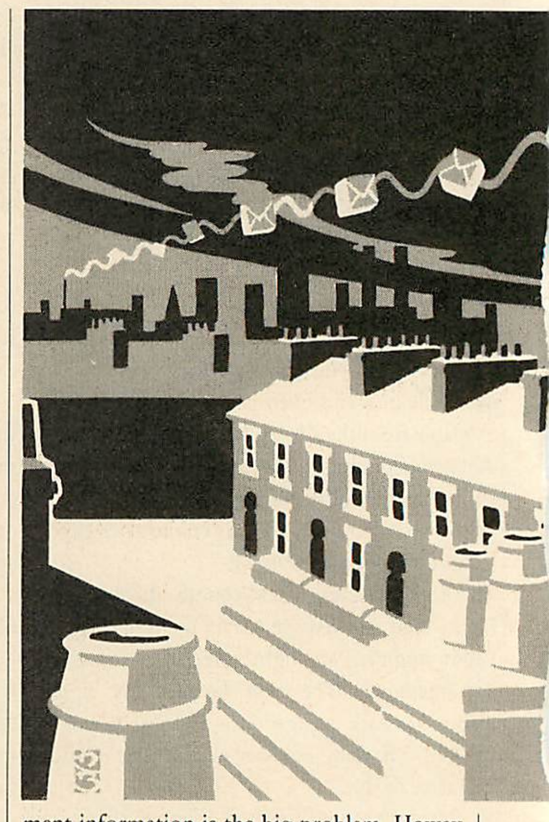


ILLUSTRATION BY RICHARD BEARDS

For packet radio, perhaps the most obvious choice would be to join the British Amateur Radio Teleprinter Group (BARTG) which was founded in 1959.

Don't be put off by the name, since although its members started out with cumbersome teleprinters, a good deal of them have progressed to micros, as do the vast majority of new members. The group has a terrific wealth of experience in sending and receiving data. It costs £7 per year to join BARTG, which has a very impressive 100-page-plus quarterly publication called *Datacom*. In the spring 1985

edition, for example, there were a couple of articles on packet radio as well as some useful advertisements for hardware.

The group has the specifications for AX25 available at £3 for those who want to do their own programming.

The magazine appears quite daunting to the layman, so it could be worth first joining RAMTOP (Radio Amateur Microcomputer Techniques Operations and Programs) – roughly two-thirds of its members own a Beeb. Its only rival in the micro/radio world is a dedicated Sinclair group.

RAMTOP has its own newsletter, which is bi-monthly and comes free with the annual membership fee of £7.50.

Perhaps the group's most important contribution in this field is that it sells two separate packet radio protocol programs. The first was written by Alan Jones and Peter Robinson who operate in the Cambridge area, and comes on tape at £2.50 and disc at £4.50. No extra interface is needed.



The other program, 'AMTEXT' (now on version II), was written by Paul Brown of the Westmorland Radio Society Packet Radio Group. It requires a very simple interface and costs £2.50 on tape. Armed with either software, a licensed operator can immediately get started sending packets to friends and other packet radio enthusiasts.

Looking to the future, the AX25 protocol started by Tuscon would make appear to make most sense. It offers compatibility with hundreds of other users worldwide, not just in the UK. AX25 is based on a well-known CCITT computer protocol, X25, which is used for telephone data communications in the UK (PSS for example). It also operates at 1200 baud (300 baud is used by AMTEXT) and is multi-user. It is thus possible to bounce packets off satellites and communicate with other users in the USA.

AX25 is most readily available in the UK by purchasing a unit from Vomek Software. It costs just under £300 but is ready-built and includes modem, interface and software. It is RS232-based, so it can be used with *any* micro – thus providing potential compatibility with a wide range of micro/radio enthusiasts.

The life-blood of packet radio will be in the publicising of the radio frequencies involved. This vital information is best gained by joining one of the above mentioned societies. However, the Cambridge net seems to operate at 144.675 MHz on Monday evenings. Meanwhile the AMTEXT faction appear to communicate with each other on Sunday mornings at 3.655 MHz.

Other suggested methods of finding the frequencies are by mailboxing GX3JI (W A Wilkinson) on Prestel (his number is 919991873). Or budding packet radio buffs can try the bulletin boards. Some like Mailbox-80 Liverpool (Tel: 051-428 8924) have packet radio special interest groups, while Hamnet in Hull, tel: (0482) 497150 claims to be dedicated to radio freaks, but sadly never appears to carry much packet radio news.

A big advantage with packet radio is that it can also be used to set up what is effectively a bulletin board of the airwaves! In the radio world, these are popularly known as mailboxes. The problem is that in theory unattended stations are disallowed under the terms of the amateur radio licence. However, it appears mailboxes using AMTOR and RTTY have been in existence for a while and are presumably tolerated by the authorities. When questioned on this point, a spokesperson at the Radio Society of Great Britain felt sure that mailboxes would be legalised if a sound case could be made. The matter would be made easier if other countries did so first. There is no reason why approval should not be forthcoming since packet radio like cellular radio is very economical items of band width.

Acorn micro owners appear to be the most heavily involved in this niche of amateur radio communications

In the USA federal deregulation of FM sidebands has led to what effectively is commercial exploitation of packet radio. A company called Dataspeed was relaying stock market information and selling Quotrek and Modio radio modems. Suprisingly Dataspeed has been taken over by no less than the Lotus Development Corps.

The general hope is, therefore, that sufficient numbers of enthusiastic amateurs will take up packet radio allowing dedicated products to be sold to unlicensed micro users. It would be the data equivalent of CB (which legally is strictly for voice communications). The advantages over using the telephone will be low cost, higher baud rates and multi-access. Since modem manufacturers have displayed an aversion to obtaining BABT approval, it is not hard to imagine radio modems coming onto the market and being used by unlicensed micro owners.

Radio Society of Great Britain, Alama House, Cranborne Road, Potters Bar, Herts. Tel: (0707) 59015.

RAMTOP, c/o Rev R P Butcher, Great Billing Rectory, Great Billing, Northants NN3 4ED. Tel: (0604) 402204.

British Amateur Radio Teleprinter Group (BARTG), PO Box 3, Llandeilow, Wales SA19 6EW. Tel: Pat and John Beedie (0558) 822286.

North London Communications, 400 Edware Road, London W2. Tel: 01-723 5521.

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DIY TERMINAL

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Graham Bartram

In the last couple of years communicating with other computers using a modem and a home micro has really taken off. There are now literally dozens of dial-up information systems, many of them free. But what are they, and how do you access them?

The dial-up systems are often called 'databases' because they contain large amounts of data in one form or another. Databases can be divided into two main types – viewdata, and scrolling. Prestel is probably the best known example of a viewdata-style database, although there are many others. Viewdata is characterised by its colourful 40-column screens, simple block graphics, and a numeric control system (ie, to access data you enter a series of numbers rather than words). On the BBC micro, they are always displayed in mode 7. All viewdata systems work in the same way, although some contain enhancements.

Scrolling databases, eg BT Gold, tend to be black-and-white text only, and work best in 80-column mode. These databases are usually controlled by giving the computer a command such as "MAIL SEND MEP081" followed by Return. Some of them have a menu system, similar to viewdata's, to help you find the information you want. These systems can be very powerful but are often difficult to use if you do not know what the commands are. Most systems provide a help facility – try commands such as "HELP" or "INFO", or in extreme cases, consult your manual!

To access these databases you'll need a modem and some 'terminal' software. There is a wide choice of modems on the market today,

ILLUSTRATION BY RICHARD BEARDS

some of which have already been reviewed in *Acorn User*. Some come with suitable software, for others you are charged extra for it. You'll find two listings on the yellow pages – one for a simple viewdata terminal, and one for a scrolling terminal.

Before you can use any terminal software you must connect your modem up to the computer. This is where the first problem arises. Acorn, in its wisdom, decided to use a five pin domino plug for the serial port. This plug is symmetrical and can be inserted into the port in two different ways, only one of which is correct. The only way to find out which way up it goes is to look at the booklet which comes with your modem. If that does not mention the plug, try inserting it with the large gap to the top. If all your attempts to connect to a dial-up service do not work, try swapping the plug around.

Once you have the modem connected you need to set the 'baud' rate. This is the speed at which the modem transmits and receives data over the telephone line.

For viewdata services you should set the transmit speed to 75 and the receive rate to 1200; this will probably be marked as 'viewdata' on the modem. For scrolling there are two different speeds. Some systems use the same speed as viewdata, ie, 1200/75, but most use 300 transmit and 300 receive.

Both these sets of speeds have two forms, 'originate' or 'answer'. If you are phoning up a database, you should always have the modem set to 'originate'.

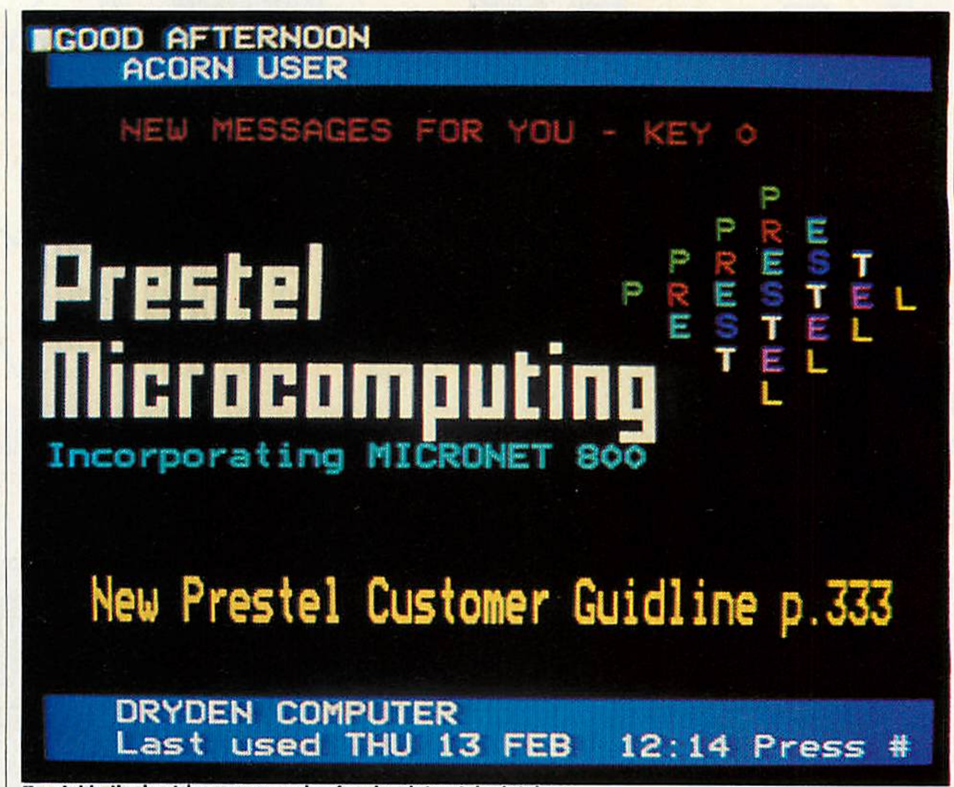
Before dialling the database you should start your terminal software, and configure it for the type of database you are phoning.

If you use the terminal programs on the yellow pages you should run *Viewdata Terminal* for a viewdata database, or *Scrolling Terminal* for a scrolling one.

The modem should have a switch on the front marked 'online', or 'modem connect'. This controls whether the modem is connected to the telephone line or not. When you are dialling the service you want, this switch should be in the 'offline' or 'local' setting. When you have dialled the number it should ring once or twice and then produce a constant tone. This is the 'carrier' and means the other computer is waiting for you to connect your modem to the telephone line.

You should now set your modem to 'online'. If you are using any software, you should also press the space-bar. You can now replace the telephone handset, as the modem is controlling the telephone line. You should now be connected to the database.

Most viewdata services will automatically send you a first page. Most scrolling databases need you to press Return several times in order to start them.



Prestel is the best-known example of a viewdata-style database

To summarise, the procedure for connecting your computer to a database is:

- Connect the modem to the computer, making sure the plug is the right way up.
- Set the 'baud' rate on your modem to the correct speed for the database you are phoning.
- Load and run your terminal software, again making sure it is set up correctly for the database you are phoning.
- Dial the telephone number of the database.
- Wait for the 'carrier' – the constant tone.
- Put your modem online, and replace the telephone handset.
- If you are phoning a scrolling database press Return a few times.

How the terminals work

What does the terminal software do? It takes what you type and sends it out through the serial port (RS423) and takes any information coming in through the serial port and places it on the screen.

Viewdata terminals are a little more complicated because they have to work out what to put on the screen, given a series of characters. For example, Escape followed by 'A' means put a red text character on the screen. This conversion is fairly simple, the real problems start with double height, which the BBC micro has great difficulty in handling itself. The terminal has to do all the hard work for it.

Now I'll look at the listings in detail and show you what they do.

Viewdata terminal

The error handling in both programs is done in Basic for simplicity, so an ON ERROR is set up, pointing to a fairly simple error handling routine. The code, having been assembled by PROCassem, is then executed.

'init' sets up the baud rates and sets the computer's serial port to seven-bit codes. It also initialises the flags and variable locations.

'loop' is the beginning of the main part of the program. The serial port is checked to see if a character has been received. If so, it is read and sent to the screen handler. The OSBYTE call, rather than OSRDCH, is used to read the buffer, because it returns a flag if the buffer is empty, instead of waiting for a character, as OSRDCH would.

Once the serial input has been dealt with, the program uses 'chkkeybd' to detect if there is a character in the keyboard buffer. If there is, the character is removed and sent to the serial output, having first gone through a simple 'convert' routine.

If the character in the keyboard buffer is greater than 127 it is sent to the 'command' routine rather than to the serial port.

The program then loops back to 'loop' to look for another character from the serial port.

'command' handles the function keys and cursor keys. The four cursor keys produce the codes H, I, J, and K. These are the viewdata (and ASCII) codes to move the cursor around. Only two function keys are used – f0 calls the operating system command routine, to allow you to do a star command and f9 exits back to

Basic. If you wish to add further commands then you should trap them here.

The function keys return codes &80 to &89, Shift function keys produce codes &A0 to &A9, and CTRL function keys produce codes &B0 to &B9. The cursor keys give you codes &8B to &8F.

'screen' decodes the characters coming in from the modem into the appropriate BBC micro VDU commands. This involves trapping Escape, and handling double height.

The actual workings of this routine are fairly complex but basically this is what it does. If the previous character was an Escape then add 64 to the current character. For example, 'A' (ASCII 65) becomes red text (ASCII 129). If the character is a double height code, set the double height flag and copy all of this line on to the following line. Make sure the top bit of the character is set. This is necessary because on the Beeb the 'Viewdata' character set runs from 128 to 255, rather than from 0 to 127. Write the character, and if the double height flag is set write the same character underneath the current one.

'controlcode' handles control codes, ie, those codes below Space. If the code is 17 or 20 the cursor is turned on and off respectively. Certain codes are also trapped so that moving off the top or bottom of the screen does not scroll it.

'convert' takes what you have typed at the keyboard and converts it into the right codes for viewdata. This involves changing Return into a '£', and swopping '£', '#' and '_' around. This is because the codes that the BBC micro keyboard generates for these three characters are not the same ones as those required by viewdata.

'oscmnd' allows you to enter an operating system command. *SAVE FRED 7C00+398 would save the current screen under the name 'FRED'. After performing an OS command you will have to type *00 to get the database to send you the last page again, as it will have been cleared by the OS command.

You could modify the software so that it stored the current screen display in a buffer before doing an OS command, as well as restoring it afterwards.

Scrolling terminal

The workings of the scrolling terminal are very similar to those of the viewdata terminal except that the screen handling is a lot simpler. Three additional features of the scrolling terminal are the ability to 'spool' what appears to a disc file, and 'type in' from an exec file, and the XON/XOFF handling.

XON/XOFF is a simple signalling mechanism which the two computers use to tell each other to stop sending data, until told to restart. This is especially important if you are using the 'exec' facility, because the Beeb will then be sending data to the other computer far faster than if it were you typing the data. The other computer may not be able to handle such large quantities of text at once and so will send an XOFF character to tell the BBC micro to stop sending data.

When the other computer is ready to start receiving data again it will send an XON. The terminal as presented here actually only waits a maximum of five seconds before starting to send data again. This is to guard against line noise. If the beeb thought it had received an XOFF because of line noise, it might never get an XON from the other computer and would therefore be stuck.

XON/XOFF can also be used to tell the other computer to pause when it is sending you a large document that you are trying to read.

The standard XON character is ASCII 17 and XOFF is ASCII 19. Therefore, pressing CTRL-S will send an XOFF to the other computer, which will then wait for you to send CTRL-Q (XON) before continuing.



What you'll find on dialling Healthdata

If you wish to add Escape codes to this terminal to emulate professional systems, there is a commented section in the listing which shows you where to insert them.

The spool and exec facilities are controlled by the function keys f1 to f4. f1 prompts you for a filename with '>>'. It then opens that file, and any input from the serial port will be stored in that file. Function key f2 closes the spool file. Function key f3 also prompts you for a filename. It then opens the specified file and starts to send the characters contained in the file to the other computer, until the end of file is reached.

Function key f4 closes the exec file before the end of file, allowing you to abandon sending a file. The errors associated with bad file names and non-existent files are trapped.

If you wish to use the scrolling terminal with a 1200/75 baud database, you'll have to change the OSBYTE calls which set the baud rate in 'init'. See the comments in the listing.

Now, you'll want some numbers to try. Here are a couple of each – all free and all 24-hour services. On these databases, you will find detailed lists of other numbers to try.

Viewdata:	Gnome at Home	01-888 8894
	Healthdata	01-986 4360
Scrolling:	Micro Live	01-579 2288
300/300	MarcTel	01-346 7150

Turn to yellow pages 114 to 119 for Graham Bartram's terminal listings



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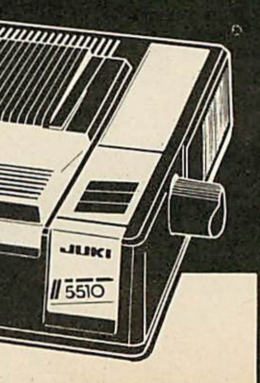
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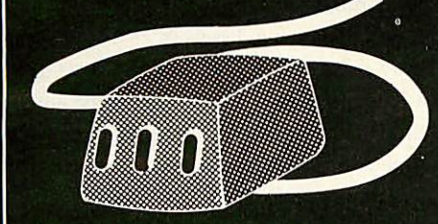
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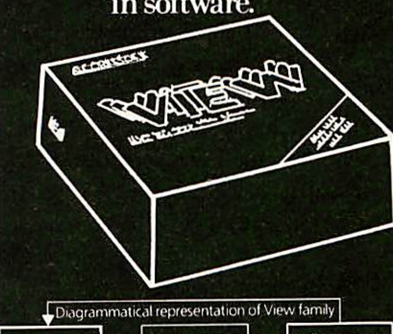
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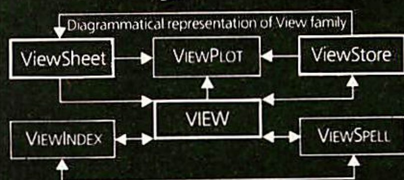
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THE WIZARD OF OS

Joe runs through the range of filing systems for BBC micros and shows how to use the operating system to discover what the current filing system is up to

Joe Telford

The most popular filing system on the BBC range of micros is the DFS, or disc filing system which first appeared back in 1981. Most of its problems have been ironed out, but the two which remain for DFS users, and cassette users yet to upgrade, are disc drive compatibility and memory space on disc – which more and more users are beginning to meet.

What we really need is a filing system which has access to a large amount of memory, quickly and reliably. So let's look at what is available. Table 1 shows the current legalised filing systems. I don't include wonders from Watford, or supersystems from Solidisk, which devotees will assure me more than meet our needs, because I feel that the more 'legal' the system, the fewer problems for the future!

The results of looking at table 1 really boil down to:

- Sticking with your DFS.
- Updating to a legal ADFS.
- Going for an alternative supplier's system.

The best bet is the floppy ADFS which is available for the BBC micros and Electron, and comes with the Master. (Econet systems get a similar system in the level 2 and 3 Econet file servers.) The ADFS when used with floppy discs provides an increase in disc memory space immediately accessible to users. Double-sided discs are formatted to hold over 600k. Obviously the idea of 31 files maximum, has to vanish. This is done by providing a 'hierarchical' filing system, which has a master or 'root' directory called '$'. Doing a *CAT will list the contents of '$', and these contents can be the usual program files, or data files – or directories. Figure 1 shows a typical ADFS disc map. The root directory contains three other directories and a file:

```
LIB       DLR (20)
VIEW      DLR (33)
BASLIB    DLR (43)
OSBOOT     WR (13)
```

Notice that program and data files are marked WR meaning (W)riteable by you, (R)eadable by you while directories are marked DLR or (D)irectory, (L)ocked for you, (R)eadable by you. These letters are called the 'file attributes'. (With Econet, they are duplicated to show not only what *you* can do as an owner, but also what *others* can do as members of the public.) The number of times each item has been accessed is shown in brackets.

Any directory or file name can have up to ten letters and new directories can be created simply by typing *CDIR newdirname to create a <newdirname>. To enter a directory type, for example, *DIR BASLIB, then *CAT and we see part of the next level down.

```
CONTROL   WR (12)
HOME      DLR (23)
TEST      WR(87)
```

You can go on doing this until you reach a directory with no other directories in it. Each directory can have up to 47 files and directories can be nested 128 deep, which gives a maximum of about 47^{129} directories, and a consequently large number of files, so not even a

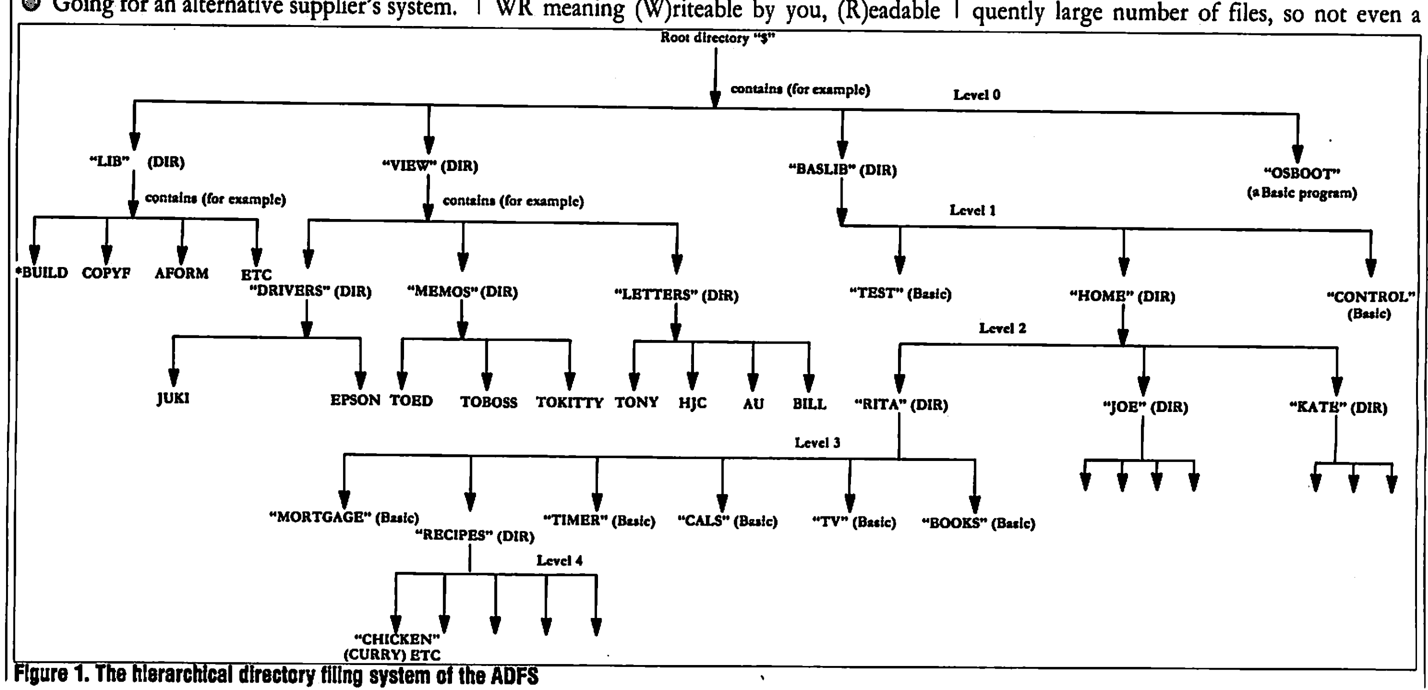


Figure 1. The hierarchical directory filing system of the ADFS

120Mbyte Winchester would suffice for all the possible entries. To return to the root directory we type: *DIR $ or just *DIR

Pathways

From any directory it is possible to go to or access a file from any other directory. For example, to get hold of the delicious 'chicken curry' recipe from level four in figure 1, we can type either:

*DIR $.BASLIB.HOME.RITA.RECIPES
LOAD "CHICKENCUR"

or

LOAD "$.BASLIB.HOME.RITA.RECIPES.CHICKENCUR"

Call	Address	Action
OSARGS	&FFDA	Load or save data about a file
OSFIND	&FFCE	Open or close a file
OSFILE	&FFDD	Load or save a complete file
OSBGET	&FFD7	Load a byte from file
OSBPUT	&FFD4	Save a byte to file
OSGBPB	&FFD1	Load or save memory to file

Table 2. Calls regarded as filing system calls

As with any new system utilities are needed to help move around with the minimum of hassle. The rest of this article is devoted to providing enough information about the hooks to the ADFS and other filing systems, for readers to produce their own utilities. I'll conclude by developing an intelligent autoboot program for ADFS or a priority NFS user. For users without these filing systems, all the information and programs work equally well on the BBC model B with DFS.

Hooks to the filing system

Let's look at what is available. Table 2 shows the calls to the operating system (OS) which are regarded as filing system calls. The problem we now face is that of selecting which routines we need to use. Table 3 shows what we need to know.

Each OS call has a number of variations (depending usually on the setting of the 6502 accumulator register when the call is made). We will work from Basic to make the learning easier, so these variations are all controlled by the A% integer variable. After spending a few days with the manuals, it transpires that all of our needs can be met by a selection of the OS calls using judicious use of A% (table 4).

For argument's sake let's start with an easy one. To find out which filing system is currently receiving our commands, we use the OSARGS call. This is shown in listing 1 in the

No	Type	Micro	Comments
1	1200 baud CFS	B, B+ Electron, Master	Slow, not 100% reliable
2	300 baud CFS	B, B+ Electron, Master	Slow, not 100% reliable
3	ROM FS	B, B+ Electron, Master	Can't save
4	DFS	B, B+, Master	Disc space may be a problem
5	NFS	B, B+, Electron, Master	Level 2 as DFS. Level 3 good but, costly
6	Telesoft FS	B, B+, Master	Can't save – Can be very slow
7	IEEE FS	B, B+, Master,	Mainly for talking to intelligent peripherals
8a	Winchester ADFS	B, B+, Master,	Super but costly
8b	Floppy ADFS	B+, Electron, Master	Most likely successor to DFS.
9	ANFS	Master B+? B?	Successor to NFS, comments as above

Table 1. The current legalised filing systems for BBC micros

yellow pages. We simply set A% and Y% to 0, call &FFDA and the filing system is returned in the accumulator:

A%=0:Y%=0:CALL &FFDA

but then the problem. A% doesn't take on board the value of the accumulator. We have to extract it another way. First rather than use the command CALL, we should use USR, because we are expecting to have data returned. A useful line would therefore be:

One last point to clear up is why we need to set Y% to 0. Well, in almost every routine A%, Y% and X% have a special meaning. In OSARGS, a Y% value of 0 actually selects this particular function, and A% is simply set to 0 as a default (no filing system). If we had accidentally set Y% to a value other than 0 problems would have occurred, as A% set to 0 would have forced file information to be written to a random address in page 0. The

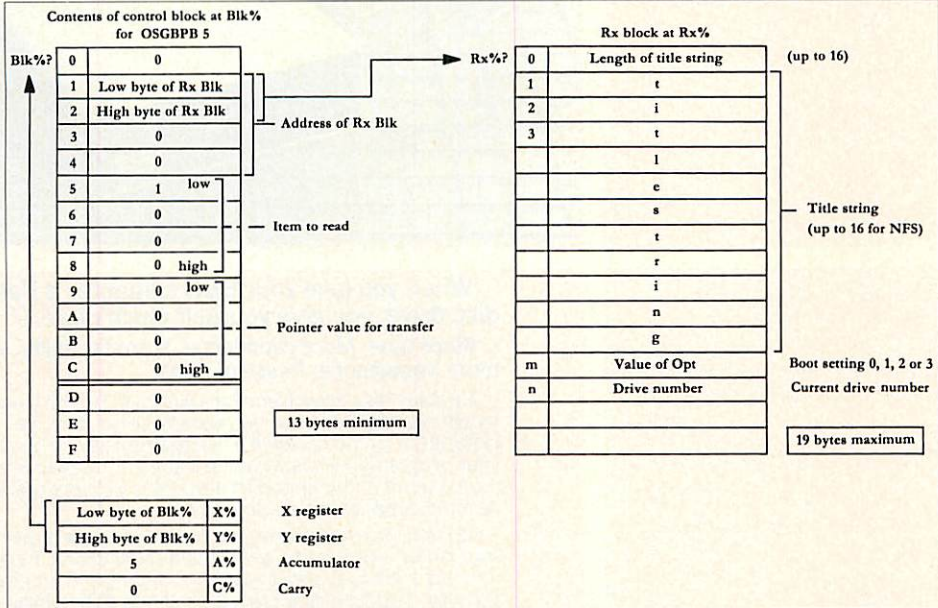


Figure 2. Control block and Rx block for OSGBPB5

A%=0:Y%=0: A%=USR(&FFDA)

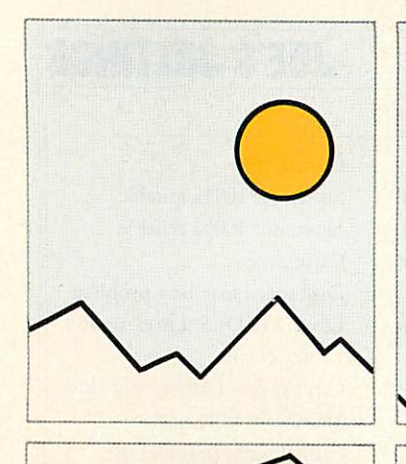
Unfortunately there are four bytes of information returned from a USR function: program pointer; value of the X register; Y register value and the accumulator. To separate out the accumulator we use a logical AND operator:

A%=0:Y%=0:A%=USR(&FFDA) AND &FF

Having got the value of the accumulator returned to A% we can decode it from table 5. PROCdecode looks after this, and line 90 of the OSARGS program (listing 1) is a reasonably elegant way of getting to PROCdecode.

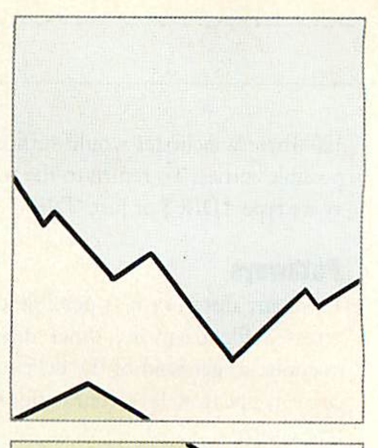
next few calls to the OS are courtesy of the OSGBPB command (listing 2). Although it handles a number of multiple byte transactions, we look mainly at those to do with the state of directories, and in particular OSGBPBs with the accumulator set to values from 5 to 8 inclusive.

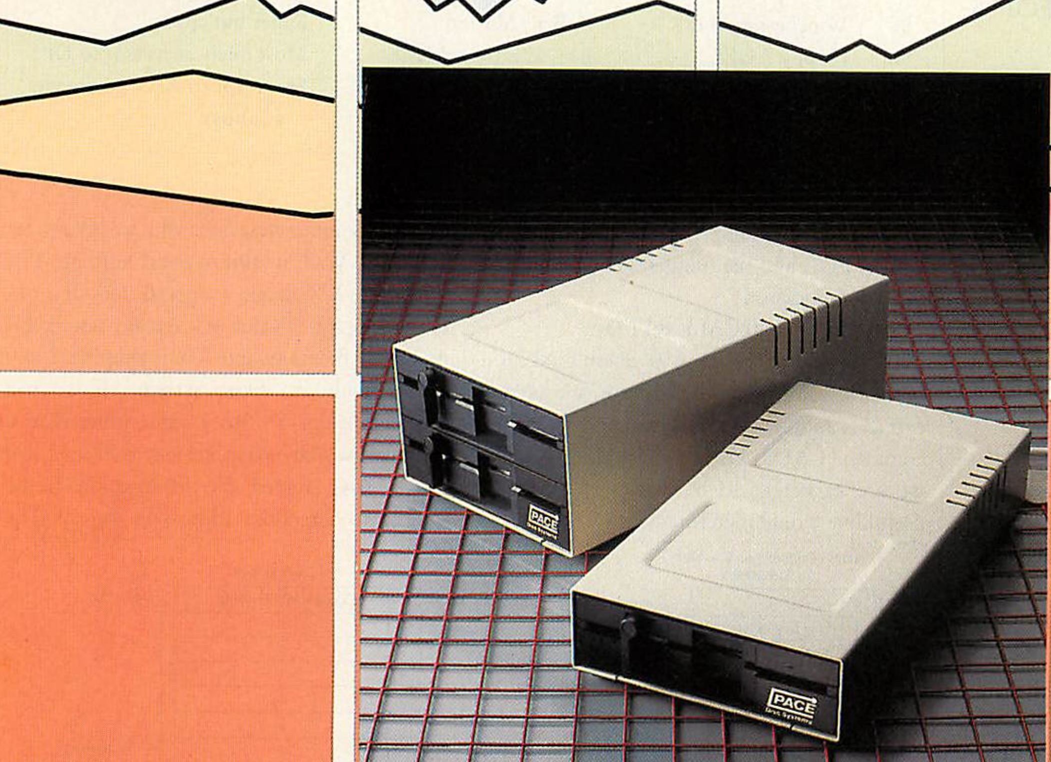
The BBC range of micros uses a software construction called a 'control block', to communicate with some OS calls. The OSGBPB call is typical in using two such blocks. The first is a block of 13 bytes (we use 16 in every case for simplicity), which contains the param-

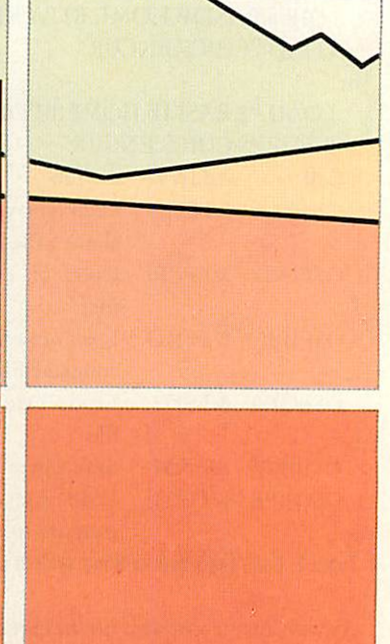




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eters for the call, and the second block is an area of memory which can contain the information returned from the call. In many cases 12 bytes will do for this second block, but for ease of programming we use 32, which covers all the instances shown. The control block for OSGBPB has 13 parameters, which are shown in table 6. A control block is created in Basic by first reserving space for it. This is done by a simple DIM command. In the following programe we use: DIM blk% 16,rx% 32 to dimension both the control block and the return block.

1. Which filing system is in use: we might know this at boot-up but our program will not unless we tell it via INPUT "filing system" FS$ or preferably via some more sophisticated way
2. Which disc, Boot option and disc title we are using
3. Current directory prefix and owner/public access rights
4. Current library disc, prefix and owner/public access rights
5. Which files are in the current directory
6. What attributes are associated with those files

Table 3. Information in choosing a filing system

The address of the first item of the control block is always blk% and the contents of blk% can be accessed by ?blk%. The second item of a control block is the byte at blk% + 1 and this is referred to as blk%?1.

Hence the sixth item of the control block is blk%?5 and in all the OSGBPB calls here this will contain the value one.

Readers might find table 6 confusing, because all the addresses have four bytes, hence an address range of &00000000 to &FFFFFFFF which is 64k × 64k or 4Mbytes. On a standard BBC, only the first two bytes of each set of four are required to cope with the 64k address range, but as soon as a second processor is used, the address of the input/output processor (the BBC micro) moves to the top of the 4Mbytes, and is accessed at locations &FFFF0000 to &FFFFFFFF. We get around this by using the first two bytes for the address of the return block and the second two bytes we set to 0. Within a 6502 second processor, this refers to a memory location within the range &00000000 to &0000FFFF, ie, inside the second processor. When the micro is used by itself, with the second processor turned off, the address points to its internal memory by default. Problems would arise if we wanted a program in one processor to address a return block in the other. Then we would have to specify every byte of the return address block.

The return block is accessed in a similar way to the control block, but unfortunately both its contents and structure are different for each call to OSGBPB. Both the control block and the return block are shown in figures 2 to 4, and the alterations for each OSGBPB are given.

When an OS call is complete, there will normally be either single bytes of data in the return block, or a string of data. The approach to extracting this data is the same in every case:

1. Single bytes are read by the ? operator, eg, drive% = ?rx%
2. Strings of data are read by placing a Return at their end, and then using the $ operator. For example, len = ?rx% :?(rx% + 1 + len) = 13:file$ = $(rx% + 1)

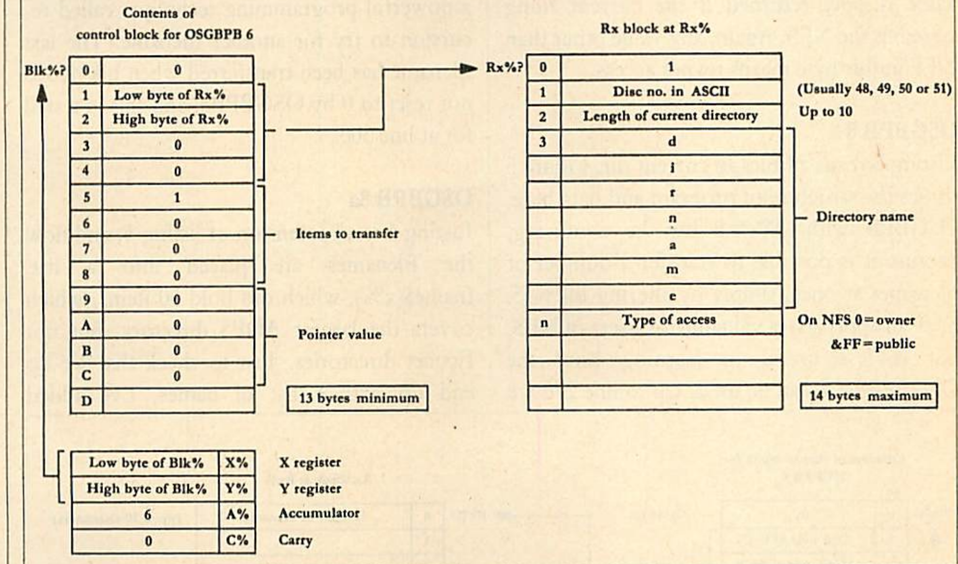


Figure 3. Control block and Rx block for OSGBPB 6

Of course if data follows immediately after a string, then the Return will obliterate it. In this case, that data must be read before the Return is written. The PROCdecode sections of the next programs show this clearly.

To find	Use	at	set A% to
Which filing system is in use	OSARGS	FFDA	0
Drive boot option and disc title in use	OSGBPB	FFD1	5
Current dir prefix and access right	OSGBPB	FFD1	6
Current LIB disc/prefix and access rights	OSGBPB	FFD1	7
Files in the current directory	OSGBPB	FFD1	8
Attributes associated with those files	OSFILE	FFDD	5

Table 4. How to set the A% integer variable

OSGBPB 5:

This is used to read the media title, !Boot option and drive number. Listing 2 has its first half in common with the other OSGBPB programs.

The approach is to dimension the control blocks, assign an address variable for OSGBPB and then work through PROCsetup, PROCcall and PROCdecode.

PROCsetup cleans up the control block setting each of its bytes to 0, using the ! operator. This acts on four bytes at a time, and so is quite elegant. I only use PROCsetup because there are so few items in the control block which are not set to 0.

PROCcall takes the number of the accumulator as a parameter, (making it easily used by all the OSGBPB programs), and places the address of the return block (rx%) in the appropriate locations of the control block. Notice that rx% MOD 256 gives the low byte of an address and rx% DIV 256 the high byte. Because one set of information is required, blk%?5 is set to 1 and the address of the control block (blk%) itself is fed to the X and Y registers. Note that X% takes the low byte and Y% the high byte. The carry flag is then cleared (C%), A% is set to the correct value, and OSGBPB is called.

Figure 2 shows the layout of the return block for OSGBPB5. The drive and Boot option are single bytes which must be read into drv% and opt% before the media title can be read as a string.

The most interesting part of reading the return block is the use of the ? operator within itself in lines 300, 310 and 320. This is a more elegant way of addressing a byte whose location depends on the length of a string (?rx%). This approach is used in each of the OSGBPB programs.

OSGBPB 6

Now we'll look at reading the current drive, directory name and access rights. Listing 3 is the same as listing 2 up to line 270, except that the call is with A% = 6. PROCdecode is specially written for the information laid out in the return block (figure 3).

The drive number is in ASCII, because it is technically a drive-title string with a length of one byte. Rather than read it as a string, we subtract 48 from its value, as shown in line 300. This problem is the access-right byte after the directory name, which is only returned with the network filing system. So any value other than &FF in this byte means owner access.

OSGBPB 7

Listing 4 reads the library drive, library name and access rights. This follows much the same format as listing 3 except that A% = 7, and the details returned have different meanings. PROCdecode is again specially written for the information laid out in the return block, as in figure 4. Again the drive number is in ASCII, because it is technically a drive-title string with a length of one byte.

The access-right byte after the directory name is only returned if the current filing system is the NFS. Again, any value other than &FF in this byte means owner access.

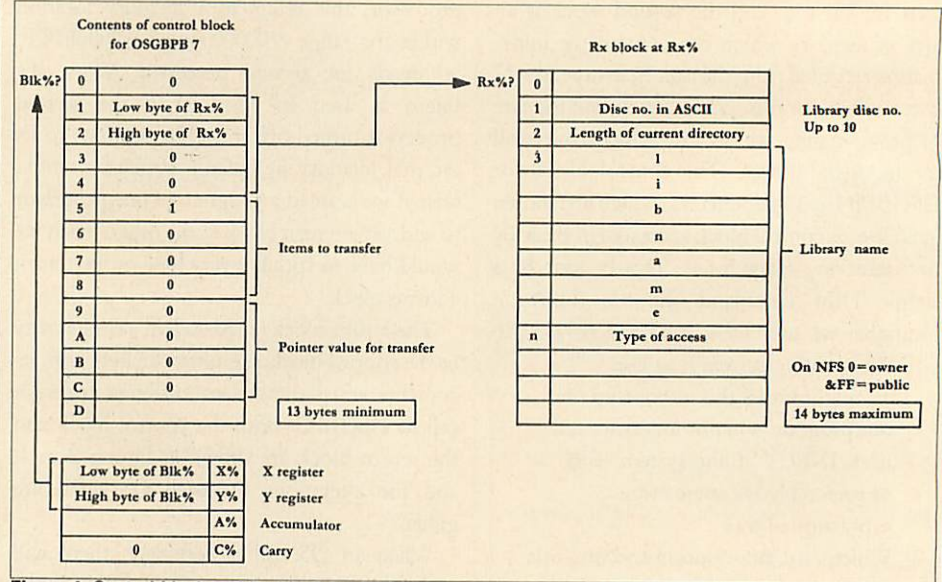


Figure 4. Control block and Rx block for OSGBPB7

OSGBPB 8

Listing 5 reads all files in current dir. Figure 5 shows the structure of program and data here. OSGBPB with A%=8 can be confusing, because it is possible to transfer a number of filenames at once, simply by altering blk%?5. Such an approach is valuable for users of NFS, but is less useful in learning how the OSGBPB8 call can be used. Up to line 270 we have the standard program as shown previously; after this we have PROCdecode.

PROCdecode needs only to read the length of the filename and drop a Return after it, which is done in line 310. Line 340 reads the filename, line 340 counts how many filenames have been transferred and lines 350 and 360 use a powerful programming technique called recursion to try for another filename. The last filename has been transferred when blk%?5 is not reset to 0 by OSGBPB8, and this is tested for at line 300.

OSGBPB 8a

Listing 6 is an extension of listing 5, and now the filenames are placed into a list, fname$(x%), which can hold 50 items, which covers the largest ADFS directory, but not Econet directories. Just to check that we do end up with a list of names, I've added PROCprint which displays the filenames, after the reading process is complete.

OSFILE 5

Although it's nice to know which files are in a directory, before we can think of taking action on any one, we should find out more about it. This we can do using the OSFILE call with A% set to 5. Look at listing 7 and figure 6 which show the program and data structure. To make things easy line 110 asks for the filename and an INPUT, and the hard work is done by PROCreadfileinfo.

Acc	Filing system
0	No FS present
1	1200b CFS
2	300b CFS
3	RFS
4	DFS
5	NFS
6	TFS
7	IFS
8	ADFS

Table 5. How to decode the value of the accumulator

First there are again two control blocks, oblk% (block for OSFILE) and tx% (block for filename). tx% simply acts as a holding address for the filename, which is pointed to by bytes 0 and 1 of oblk%. Once called, OSFILE takes the string at tx% and goes to the filing system. If it succeeds in finding the file, the information on the file is transferred from the filing system to the oblk% control file, filling the bytes from oblk%?2 to oblk?&E and up to oblk%?&11 if the filing system is the NFS.

Before looking at the file information, it's as well to decide if the file requested was on the disc. Line 220 calls OSFILE and then extracts the returned accumulator value. If this is 0 then

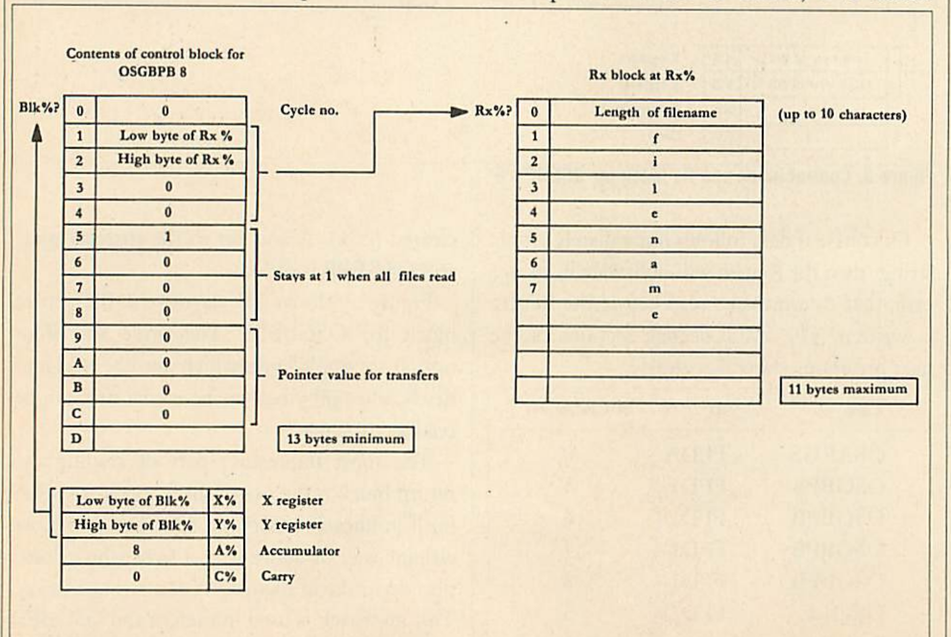


Figure 5. Control block and Rx block for OSGBPB8

the returned accumulator value. If this is 0 then the file was not found, and the procedure is exited. Other values include:

Acc	Reason
0	File not found
1	File found
2	Directory found (ADFS/NFS)
&FF	Protected file found – only *RUN available

Once sure that a file exists we can read the oblk% control block and check its details. As figure 6 shows we can extract the file's load address, executing address and length without any difficulty (lines 260, 270 and 280). The difficult attributes are those hidden in oblk%?&E. This contains information on access (writability/readability/locked) for the owner and people with public access on the NFS. The decoding strategy used in lines 300 to 380 is not the most elegant, but it demonstrates what needs doing. If no network use is expected, lines 440 to 470 can be omitted.

Network devotees can conclude this section with a problem: the next bytes of the control block (oblk%?&F, oblk%?&10 and oblk%?&11) contain the creation date of the file in days, months and years after 1981. Perhaps they would like to decode these?

Osboot

Now to look at a typical application using these calls. The NFS, but more so the ADFS, is not tremendously friendly when first booting up. The OPT command can normally load only one program, irrespective of where your target program is on the disc. What would be nice would be a boot program which:

- loads on Shift-Break from directory $
- displays the current directory items with a good guess as to what they are
- allows us to select any directory item by single keypress
- takes appropriate action depending on what item matches the keypress
- allows us into any directory just running the Basic language.

I could think of other nice features, but why take away the fun from you users, so take the program and amend it to suit.

Using Osboot

Listing 8 is the Osboot program, and it should be entered into the computer, then saved into the $ directory of your ADFS or NFS.

If you have only got a DFS system, it will still work provided all your files are in the $ directory. Next build up a !BOOT file as follows:

```
*BUILD !BOOT
0001 *BASIC
0002 MODE 3:VDU19,0,4,0;0;0;
0003 CH."OSBOOT"
Press ESCAPE
*OPT 4,3
```

RAM address	Normal contents	Used for	
Blk% ?0	0	Cycle number	(on A%=8)
?1	&LL	(low byte)	
?2	&HH	( )	of address of return block
?3	0	( )	
?4	0	(high byte)	
?5	1	(low byte)	
?6	0	( )	number of sets of info
?7	0	( )	to transfer
?8	0	(high byte)	
?9	0	(low byte)	
?A	0	( )	pointer to next item to transfer
?B	0	( )	only on A% = 8
?C	0	(high byte)	

Table 6. The 13 parameters of the control block for OSGBPB

You could replace line 0002 with mode 7 but this is up to the user. Now pressing Shift-Break (or Shift-A-Break) will load and run the Osboot program. The screen clears and the current filing system is displayed, along with the initial $ directory.

Under this is a set of filenames, information and keypresses for access.

MEM........*RUN filename
PRO........*RUN filename
BAS........Chain "filename"
DIR........*DIR filename ...enter new dir

The remainder of the information on display are the file attributes for owner public access. So if an error occurs you were warned! If after travelling far down the arm of a directory you wish to return to the root, simply press Escape.

Rather than give a line by line account of the Osboot program, a list of procedures and their

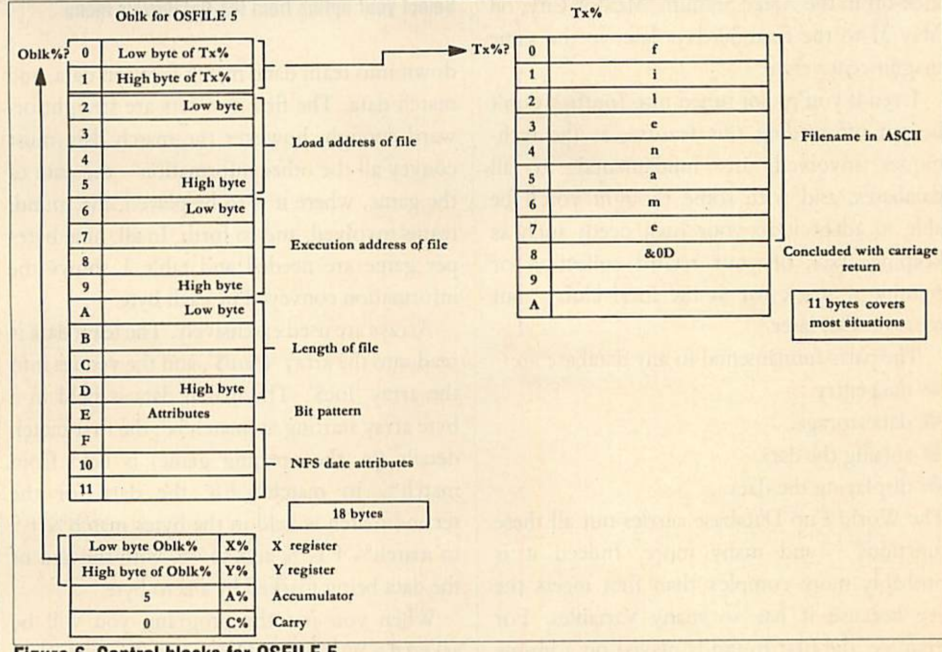


Figure 6. Control blocks for OSFILE 5

First comes the keypress which can call that facility. Next the filename, then the attributes. Osboot tries to be as helpful as possible saying what it thinks are DIRectories, BASic files, DATa files, PROtected files and MEMory dumps, ie, potential machine language programs. Pressing any particular letter causes Osboot to try to do the most logical thing with that file:

DAT........Ignore... It's just data

tasks should suffice, as we've met the intricate calls earlier. We can do things like:

- *EXEC all files that are :DAT and have a ! prefix.
- differentiate between :MEMory and a new :CODe filetype.
- if, say, a file is a *View* file then drop into *View* and load it

Turn to yellow pages 120 to 123 for Joe Telford's listings and program notes

WORLD CUP FEVER

Follow the World Cup football through to the final on your micro with this database listing – or, if you're not a sports fan, adapt it to your own needs

Bruce Smith and David Acton

If you have even only a passing interest in football, the next few weeks are going to be absolute bliss it's World Cup time. You may be wondering what *AU* is doing featuring the World Cup on its front cover and within its hallowed pages. The connection is really quite simple – you need a television screen for both your micro and the football! No, seriously though, we're presenting you with a World Cup Database (WCD) which will allow you to monitor the progress of the 24 teams in the competition from the kick-off in the Aztec Statium, Mexico City, on May 31 to the final 30 days later in the same magnificent venue.

Even if you're not tuned into football don't be put off reading this feature, as the techniques involved are fundamental to all databases, and with some thought you'll be able to adapt it to your own needs such as keeping track of your record collection or running a snack bar at the local club – but more on that later.

The parts fundamental to any database are:

- data entry.
- data storage.
- sorting the data.
- displaying the data.

The World Cup Database carries out all these functions – and many more. Indeed it is probably more complex than first meets the eye because it has so many variables. For example, the first round is played on a league basis where the 24 teams are divided into six groups. The subsequent rounds are on a straight knock-out basis and there is a further complication because, at the time of writing the database, we don't know who will be playing whom – so the formula for this must be included in the database!

To store all the initial team and game information we have to resort to good old DATA statements. These can be seen towards the end of the program listing and are broken



Select your option from the Database's menu

down into team data, match location data, and match data. The first two sets are straightforward enough, however the match data must convey all the other information – the date of the game, where it is to be played, the round, teams involved, and so forth. In all, nine bytes per game are needed and table 1 shows the information conveyed by each byte.

Arrays are used extensively. The team data is read into the array 'team$', and the venues into the array 'loc$'. The match data is held in a byte array starting at 'match%'; the first match details (ie, the opening game) is held from match% to match%+8; the data for the second match is held in the bytes match%+9 to match%+17% and so on, with the end of the data being marked by a zero byte.

When you run the program, you will be asked if a World Cup Data file exists. First time out respond with N for No. After you have entered the results for the day you can save all the new updated data in a random access file on cassette or disc. Next time you run the program respond to the initial question with Y for Yes and the datafile will be loaded in so that you are up-to-date. If you want to experiment and try to predict the results you can, and then refer to them after the event to see how well you fared! To produce the match calendar tables the match data bytes must be sorted prior to displaying the tables on the screen – this is done by PROCtimesort which uses the bubble sort technique. A bubble sort is a compare and swap sort. It takes the first and second items of data and compares them. If the first is greater than the second it swaps them. The second and third items are compared and again swapped if necessary. This process continues until all bytes have been compared. The routine then repeats and when a complete pass through the data is made without a swap being made the bubble sort has been completed. In this way small numbers bubble up to the top of the list while high ones appear to sink.

Byte	Information	
0	Round	(1 = first, 5 = final)
1	Month	(5 = May, 6 = June)
2	Date	
3	Location	(1 = Aztec Stadium, etc)
4	Team 1	(1 to 24)
5	Team 2	(1 to 24)
6	Played flag	(1 if played, 0 otherwise)
7	Score team 1	
8	Score team 2	

Table 1. The Database match bytes

In the WCD the tables are sorted by date. The variables d1% and d2% contain the data for the two matches being sorted and is calculated as date(+32*month).

The match numbers are given in m1% and m2%, the latter is used in a loop from m1% to the last match. For each match specified by m1% a comparison is made for all the matches beyond it. If d2% is less than d1% then PROCswap is called to swap the nine bytes of data held at a1% and a2%. In this way the earliest matches played bubble to the top of the list and the routine gets faster as it progresses as there are less matches to sort.

When all the data has been entered and sorted it is BPUT to a datafile called

ILLUSTRATION BY ELLIS NADLER



Item	Action
gt$	Group team name
gf%	Goals for
ga%	Goals against
gp%	Matches played
gpt%	Points
match%	Match data block
PROCvars	Initialise variables
PROCinitdata	Read and setup data
PROCent	Enter result
PROCresults	Main results menu
PROCdispres	Display individual result
PROCdispround	Display results for given round
PROCfirstround	First round display by groups
PROCdispgroup	Display group table
PROCcalcgroup	Calculate the group placings
PROCcalendar	Display match calendar
PROCload	Load datafile
PROCsave	Save datafile
PROCdcent	Display double height text
PROCwdow	Define text window
PROCass	Assembler for 64 column mode 4 text

Table 2. Variables and procedures

WCDATA which can be reloaded at a later date. Table 2 lists the main variables and procedures in the program. One item of interest concerns the assembler listed in PROCass, which is a machine code version of Jonathan Temple's piece in Acorn Forum (page 176) which allows the use of 64 characters in a mode 4 screen.

As we mentioned earlier the database could be converted to almost any requirement you have. *Acorn User* would be interested to see how you use it. So if you customise it for you own needs send us a copy. The best ones we receive will be awarded a prize of £20 and included on the monthly disc. Prize-winners announced before the *AU* exhibition will also receive a complementary ticket to the event. Please send your database on disc or tape to us and mark the envelope DATABASE. Make sure you include some documentation as well as some sample files. Include an sae if you want it returned.

We can't finish without sticking our necks out, so the Bruce Smith last four are Argentina, Italy, France and England. Dave 'I don't know anything about football' Actionless reckons the final will be a close thing between Milton Keynes Town and St Trinians . . .

The World Cup Database listing is on yellow pages 123 to 128

COMPETITION

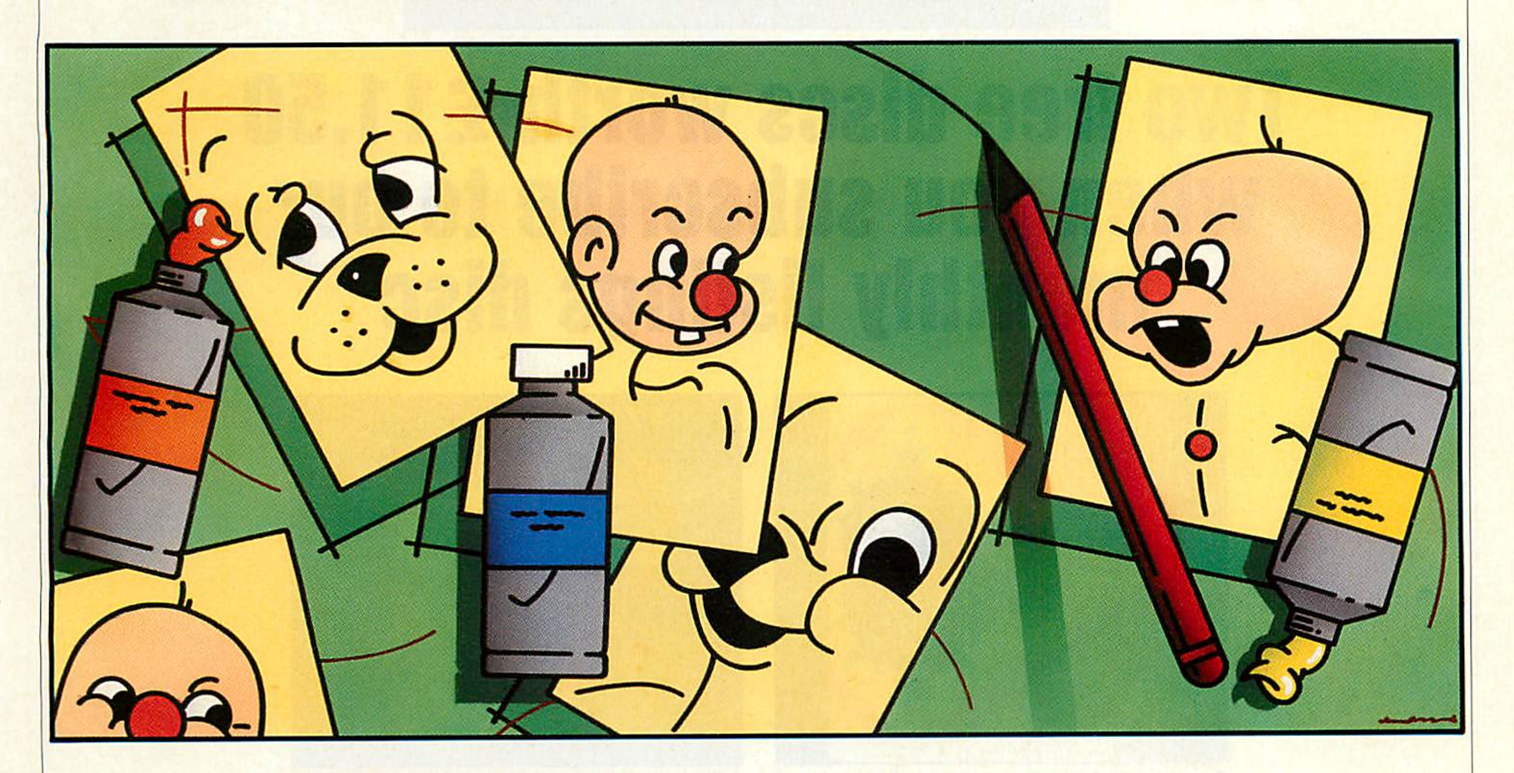


ILLUSTRATION BY ANDREW MacCONVILLE

WIN FLEET STREET EDITOR

Three Mirrorsoft packages with Disney discs to be won, plus 25 runners-up prizes of *Strike Force Harrier* game

Tony Quinn

Calling all budding cartoonists . . . there are three *Fleet Street Editor* publishing packs – plus Walt Disney character discs – up for grabs if you can invent a new character suitable for use in a Walt Disney movie, and give it/him/her an original and appealing name.

The idea is that you send us a drawing or printout of a character invented for one of the following types of Disney films:

- Traditional cartoon characters such as Bambi or Mickey Mouse.
- Science fiction characters from films like *Tron* or *The Black Hole*.
- Fantasy monsters and heroes such as those in *Return to Oz*.

Your creation can be done by pencil or pen, painted, even developed on a computer graphics system, but it must be sent in on paper. Make sure you put your name and address on the same sheet as well as the name of the character you devise.

The entries will be judged on their originality and appeal to all the family.

There will be disc-based *Fleet Street Editor* pack from Mirrorsoft (which costs £39.95 in the shops) for the winner in each category along with a disc full of more than 100 Disney cartoon characters to load in and use with *Fleet Street Editor* (£14.95 each normally). *Fleet Street Editor* was reviewed in the May issue of *Acorn User*.

Make sure you fill in the box on the entry form as to whether you have 40- or 80-track disc drives.

Also there will be 25 runners-up prizes of Mirrorsoft's best-selling *Strike Force Harrier* game for the BBC micro.

The entries must be received by June 9. They will be judged by a representative from *Acorn User* and Mirrorsoft and the judges' decision will be final.

All entries must be sent in on paper, and not on cassette or disc. If you want your entry returned, please include suitable return postage and packing.

Send your entry with the coupon below to June Competition, Acorn User, 141-143 Drury Lane, London WC2B 5TF.

Send your entry to arrive by June 9 to June Competition, Acorn User, 141-143 Drury Lane, London WC2B 5TF. Suitable postage and packing must be included if you want the entry returned.

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My character's name is ______________________________

My character is for a traditional/science fiction/fantasy Disney film*

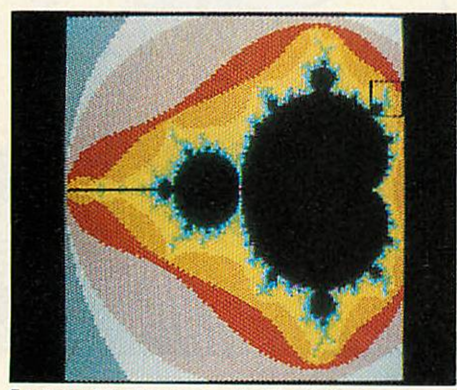
I would like 40/80 track discs* if I win (if no preference expressed, 80-track will be sent)

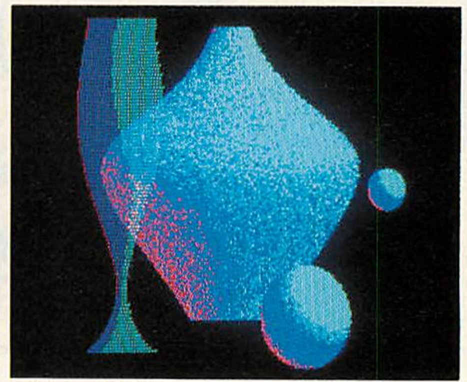
Delete as necessary

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Two free discs worth £11.50 when you subscribe to our monthly listings disc





Past graphics bonuses – the Mandelbrot set screen was featured in May and 3D graphics in June

For a limited period only, we are offering you the chance to receive 14 *Acorn User* monthly listings discs for the price of 12. A real saving of £11.50 – only when you subscribe now!

Overseas readers should add £7 for surface mail (and airmail for Europe) or £15 for airmail delivery (rest of the world).

The discs contain all the programs presented in each issue of *Acorn User*, so you don't have to type in the listings from the yellow pages – saving you time and trouble as well as money. Just load the disc and off you go.

Plus there's an added bonus – each month the discs contain screens featured in the magazine which are not included on the monthly listings cassettes, so you get even more for your money!

You can see some of these graphics screens pictured above. The discs are supplied in 5.25in 40-track format, and conversion instructions are included for 80-track disc users.

Complete the form below and post it, with your remittance, to the Subscriptions Manager, Christine Allen, Redwood Publishing, Lambourn Woodlands, Newbury, Berkshire RG16 7TW.

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HA12

ACORN USER OFFER

Easy-fit sideways RAM at easy prices!

● 16k ● Fully-compatible with BBC B/B+ ● Backed by *Acorn User* ● 3 minutes to fit ● Software support ● Comprehensive manual ● Disc ● Simple for schools ● Ideal for Econet ● No soldering

Take a piece of software, load it in UserRAM using the utilities provided and it can be accessed instantly using a '*' command or run as a Basic program.

The *Acorn User* UserRAM is as easy to install as a sideways ROM, with just one lead to clip onto the leg of a chip (there's a choice of two) – there's no need to unplug the chip to fit the lead. It takes three minutes to do.

A comprehensive printed manual gives fitting instructions, information on how to create your own sideways RAM software and technical notes on how the utilities provided work. Also, a standard disc (which runs on 40 and 80 track drives with any DFS and is unprotected) is supplied with all the basic utilities needed. One year's guarantee is given, with postage and VAT included.

Copyright notice:
No party connected with this product will give aid to anyone seeking to break software copyright. *Acorn User* welcomes details from software houses willing to license schools and other users of UserRAM for their products.

So easy to fit

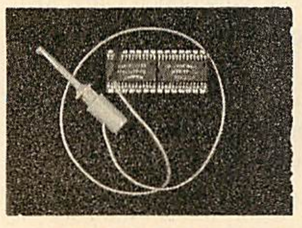
- Switch off BBC micro. Remove lid and keyboard to reveal sideways ROM sockets.
- Insert UserRAM into any empty sideways ROM socket, just like a normal chip.
- Take lead over to left of BBC board and clip to leg of a chip (does not have to be soldered, or chip removed).
- Replace keyboard and lid.
- That's it! You're ready to check the installation with the software supplied.

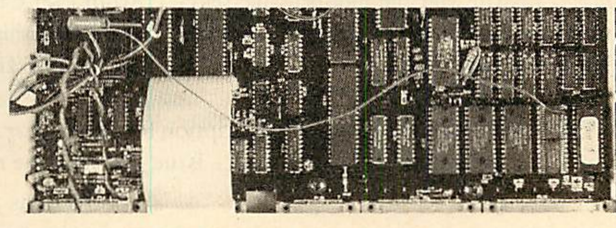
Pack 1 £38.50

- 16k sideways RAM chip with attached connecting lead.
- Disc of utility software.
- Instruction booklet.

Pack 2 £57.95

- As in pack 1, plus
- 19 new utilities including printer buffer, *FORMAT and *VERIFY for discs, ROM auto boot, two OS calls, save graphics screen, list function keys, and more.
- BBC Micro ROM Book by Bruce Smith (published by Collins at £9.95).





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POSTCODE 107-6

SIGNED DATE HA6

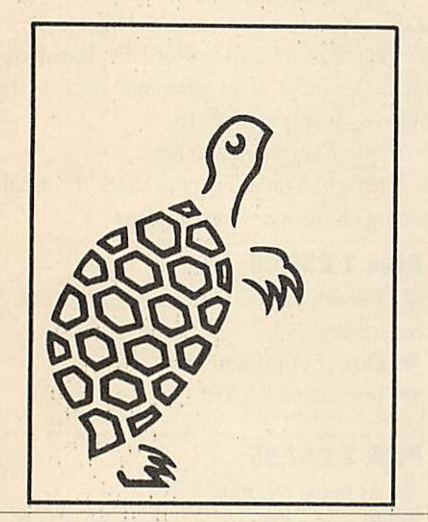
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ACORNUSER

GRAPHICS



Subscribe to the *Acorn User* monthly program listings on cassette, and we will send you both of our special cassettes, worth £3.95 each (see page 101 for details).

These are the entertaining and ever popular *Graphics* cassette and the indispensable selection of programs from the magazine contained in the *Best of Acorn User*.

Don't wait, subscribe now, while our offer lasts. Remember our cassettes are suitable for use with the Electron and the BBC micro.

Complete the form below and post it, with your remittance to Subscriptions Manager, Acorn User Cassette Subscription Offer, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.

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HA2

SPECIAL CASSETTES

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ACORN USER GRAPHICS CASSETTE



This Spiderman screen was created using Paintbox

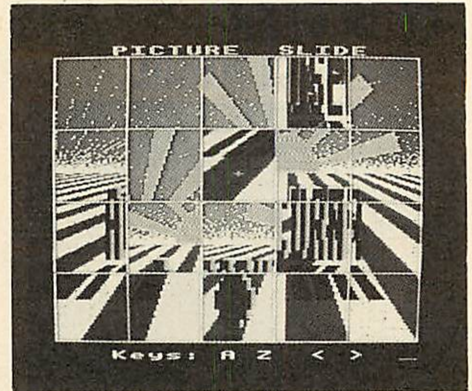
Four of the most popular and useful graphics programs that we've presented in *Acorn User* – Rob Fenton's *Paintbox*, Peter Sandford's *Colfill* and *Dotfill* and Harry Sinclair's Sprite designer – are now available on one cassette, suitable for use with the BBC micro or Electron, competitively priced at £3.95.

Paintbox, (February 1985), offers you a wide palette of facilities – airbrushing, drawing circles and squares, colour filling, colour mixing and textured effects – and it's fast!

Peter Sandford's *Dotfill* and *Colfill* (January and February 1985) allow you to produce bar charts, pie charts, maps, etc, with up to 28 coloured fill patterns and 24 tone patterns, and to mix foreground and background colours.

Harry Sinclair's Sprite designer from the September, October and November 1984 issues of *Acorn User* lets you design full-colour cartoon figures quickly, then edit, clone or mirror them and move them around the screen.

BEST OF ACORN USER CASSETTE



Picture Slide from the Best of Acorn User

The second cassette to be introduced in our developing range of special cassettes, *The Best of Acorn User*, contains a comprehensive selection of 11 program listings from past issues, which you will find entertaining and useful.

It features Malcolm Banthorpe's Turtle Graphics program, an easy introduction to Logo; an all screen mode printer dump for Epson and Epson-compatible printers; a bad program recovery routine for those times when it seems all is lost; a selection of sideways RAM utilities to help you make the most of your discs and ROMs, and two games to keep you amused, *Picture Slide* and *Quadline*.

Also included are a 40/80 track disc formatter, a tape to disc transfer routine, a disc menu and a painting program.

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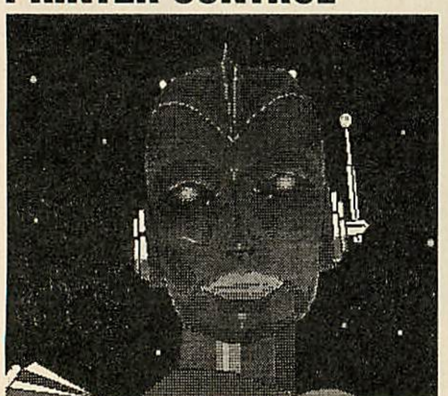
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ROMS

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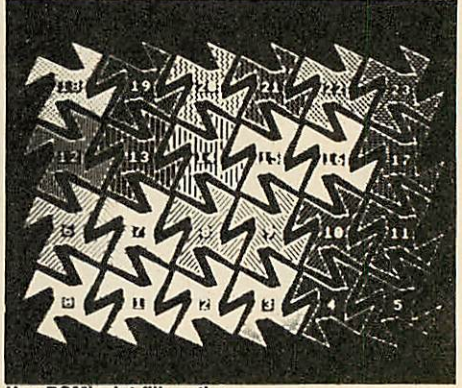
UserDump and UserROM only £19.95 each

ACORN USER PRINTER CONTROL



Dump your graphics with UserDump

ACORN USER ON A CHIP



UserROM's dot fill routine

UserDump includes a ROM chip which plugs into any free ROM socket on your BBC micro, and an easy-to-use manual. With *UserDump* you'll have a wide range of commands to help you control your printer's facilities. You will be able to dump any screen image in any display mode by entering a single command – either as a line of your program or direct from the keyboard.

UserDump will work with all popular dot-matrix printers including most Epson compatible printers and all printers with single and double density bit image graphics.

UserDump provides extra commands including: whole screen, graphics window and text window dumps, fast screen dump, definition of a graphics window plus many more.

The *Acorn User UserROM* brings the best of *Acorn User* into your micro. Put together by our technical editor, Bruce Smith, this 8k ROM chip is packed with your favourite *Acorn User* routines. Simply plug the ROM chip into a spare sideways ROM socket and all the routines are instantly accessible via easy to use * commands – what could be simpler!

Routines include the popular colour fill and dot fill routines, bad program recovery, variable lister, function key lister, a graphics compiler, a circle drawing routine, a bulletin board, screen compressor, on screen character fonts, ROM lister, sound compiler, plus lots, lots more!

A 22-page manual comes with *UserROM* and includes many demonstration programs.

Note: Acorn User retains the right to alter the contents of UserROM without obligation.

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______ UserROM(s) £19.95 each

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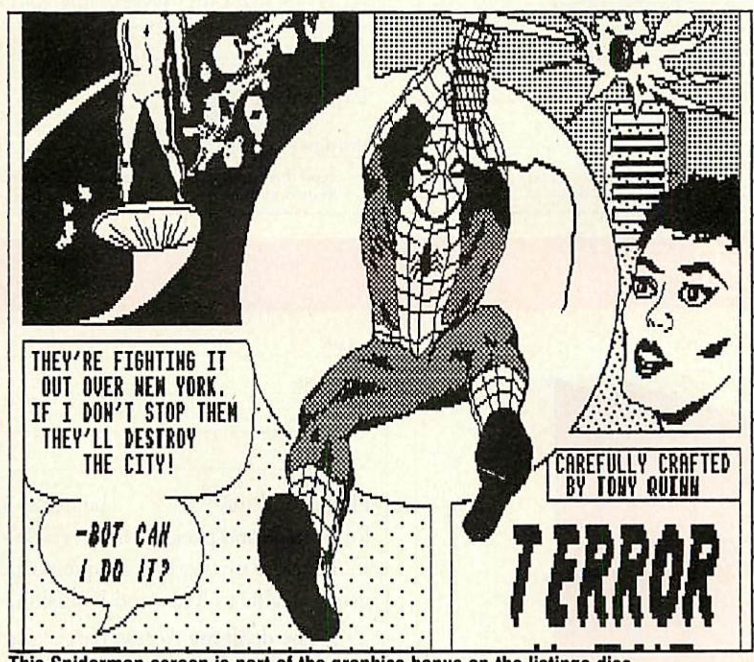
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ACORN USER OFFER

June listings on cassette £3.75 or disc £5.75



This Spiderman screen is part of the graphics bonus on the listings disc

June's program listings cassette, priced £3.75, features *Acorn User*'s very own World Cup Database to help to you keep track of each team's progress through the premier football competition. Communications feature heavily and Graham Bartram's comms software will save you the expense of a ROM chip – just supply the modem and you get instant access to the world of databases and bulletin boards.

As always there is a disc version of the June programs which contains a graphics bonus. This month it's some sample screens saved from *Pagemaker*, including Spiderman, and you don't need *Pagemaker* to view them. The disc costs £5.75.

Back issues are available on cassette from May 1984 and on disc from October 1985. Tapes cost £3.75 each and discs just £5.75!

Please send me a cassette of all major BBC micro and Electron program listings

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1985 January, March, April, May, June, July, August, September, October, November and December

1986 January, February, March, April and May

If you need further details about the contents of these issues send an sae to Back Issues, Seran Anderson-Haddick, *Acorn User*, 141-143 Drury Lane, London WC2B 5TF.

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YELLOW PAGES

INDEX/COMPATIBILITY

INDEX

Program		Page	BBC B	BBC B+/ 128k	BBC ADFS	Shadow RAM	Electron	Electron with Plus 1	Electron with Plus 3 and Plus 1	Master 128	Master 128 with ADFS	6502SP	Econet	Monthly disc/ tape
Hints & Tips	Listing 1	113	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
	Listing 2	113	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Terminal Software	Listing 1	114	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
	Listing 2	117	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
Joe's Jottings	Listing 1	120	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Listing 2	121	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y(a)
	Listing 3	121	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y(a)
	Listing 4	121	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y(a)
	Listing 5	122	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y(a)
	Listing 6	122	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y(a)
	Listing 7	122	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y(a)
	Listing 8	123	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y(b)
World Cup	Listing 1	124	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y

(a) Plus 1 not required but Plus 3 essential. (b) ADFS, NFS or ANFS required.

Entering listings

Where possible, programs are listed with line numbers in increments of 10 so type AUTO <RETURN> for automatic line numbering before you start. Don't type a space after the line number. To list your program so it appears identical to the printed version in the magazine, type:

LISTO 1<RETURN> WIDTH 40 <RETURN> LIST <RETURN>

With screen modes 1,4,6 or 7, WIDTH 40 is not needed. Occasionally, for clarity, programs are listed with a text width different to 40 characters.

Typing errors in Basic will usually cause error messages when the program is run. Finding errors in assembly language listings can be harder so we provide small, checking routines (called 'checksums') where possible.

All the Yellow Pages listings will work with Basic 1, 2 and 4 (unless stated otherwise) and with operating system OS1.2 or later operating systems.

Great care is taken to ensure the listings printed are correct but turn to Blunder box (page 18) to check if any errors were made in the previous issue.

Hints & Tips see page 51

Listing 1. Alters the 'characters per line' register of the BBC display chip

```
   10 REM Hints & Tips - listing 1
   20 REM by A Stern & A Yankilevich
   30 REM for BBC B/B+/M
   40 REM (c) Acorn User June 1986
   50 :
   60 bored=FALSE
   70 REPEAT
   80 MODE 7
   90 REPEAT
  100 INPUT"Mode (0,1,2,4 or 5) "M%
  110 UNTIL INSTR("01245",STR$(M%))>0
  120 MODE M%
  130 VDU 23;8202;0;0;0;
  140 IF M%<3 THEN N%=2^(M%+1) ELSE N%=2
^(M%-2)
  150 PROClines
  160 PRINTTAB(40/N%,15)" Press a key "
  170 key=GET
  180 IF M%<3 THEN number=80 ELSE number
=40
  190 FOR C%=0 TO number
  200 *FX 19
  210 VDU 23,0,1,C%;0;0;0
  220 key=INKEY(25)
```

Continued ▶

◀ Continued

```
  230 NEXT C%
  240 key=GET
  250 UNTIL bored
  260 :
  270 DEF PROClines
  280 FOR X%=0 TO 1278 STEP N%
  290 GCOL 0,RND(15)
  300 *FX 19
  310 MOVE X%,0:DRAW X%,1024
  320 NEXT X%
  330 ENDPROC
```

Listing 2. Produces 3D polygons

```
   10 REM Hints & Tips - listing 2
   20 REM by Bernard and Clare Emblem
   30 REM for BBC B/B+/M/E
   40 REM (c) Acorn User June 1986
   50 :
   60 MODE 4
   70 VDU 19,0,4,0,0,0
   80 VDU 23;8202;0;0;0;
```

Continued ▶

◀ Hints & Tips listing 2 continued

```
90 sx=800
100 sy=400
110 FOR S%=3 TO 50
120 PRINTTAB(15,1);S%;" sides"
130 PROCpolygon(S%,sx,sy)
140 PROCjoin(S%,sx,sy)
150 PROCpolygon(S%,sx-200,sy-200)
160 PRINTTAB(4,30)"Press the space bar
to continue"
170 *FX 21,0
180 REPEAT:UNTIL GET=32
190 CLG
200 NEXT S%
210 END
220 :
230 DEF PROCpolygon(N%,sx,sy)
240 x=sx:y=sy
250 FOR I%=1 TO N%
260 PROCcalc
270 PLOT 5,x,y
280 NEXT I%
290 ENDPROC
300 :
310 DEF PROCjoin(N%,sx,sy)
320 x=sx:y=sy
330 FOR I%=1 TO N%
340 PROCcalc
350 PLOT 1,-200,-200
360 NEXT I%
370 ENDPROC
380 :
390 DEF PROCcalc
400 size=1500/N%
410 angle=2*PI/N%
420 MOVE sx,sy
430 MOVE x,y
440 x=x+size*COS(I%*angle)
450 y=y+size*SIN(I%*angle)
460 ENDPROC
```

DIY Terminal, see page 87

Listing 1. Accesses Prestel-type databases with a modem

```
10 REM Viewdata Terminal
20 REM by Graham Bartram
30 REM & Dave Atherton
40 REM for BBC B/B+/M
50 REM (c) Acorn User June 1986
60 :
70 *TV 255
80 *FX 229,1
90 cmnd=&4000
100 osbuff=cmnd+40
110 code=osbuff+20
120 PROCassem
130 PROCchecksum
140 MODE 7
150 PRINT "Dial the computer and ";
160 PRINT "press";CHR$(133)"SPACE";
170 PRINT CHR$(135)"when"'
180 PRINT "you hear the carrier.";
190 REPEAT
200 UNTIL GET=32
210 ON ERROR GOTO 260
220 CALL code
```

Continued ▶

◀ Continued

```
230 *FX 229,0
240 END
250 :
260 REM Error
270 VDU 26
280 PRINTTAB(0,24)"Error :"CHR$(129)CH
R$(157)CHR$(131);
290 P%=&FFFF AND !&FD
300 REPEAT
310 P%=P%+1
320 VDU ?P%
330 UNTIL ?P%=0
340 VDU 32,32,156
350 T=TIME+350
360 REPEAT UNTIL TIME>T OR ADVAL(-1)
370 GOTO 210
380 :
390 DEF PROCassem
400 osrdch=&FFE0
410 oswrch=&FFEE
420 osword=&FFF1
430 osbyte=&FFF4
440 oscli =&FFF7
450 escflag=&70
460 dh=&71
470 char=&72
480 xpos=&73
490 ypos=&74
500 lfonly=&75
510 keybdin=0
520 serialin=1
530 serialout=2
540 curxy=&86
550 rdscr=&87
560 inschar=&8A
570 remchar=&91
580 :
590 FOR pass=0 TO 2 STEP 2
600 P%=code
610 [OPT pass
620 .init
630 LDA #0
640 STA escflag
650 STA lfonly
660 LDA #64
670 STA dh
680 LDA #22
690 JSR oswrch
700 LDA #7
710 JSR oswrch
720 LDA #7
730 LDX #4
740 JSR osbyte
750 LDA #8
760 LDX #1
770 JSR osbyte
780 LDA #2
790 LDX #2
800 JSR osbyte
810 LDA #156
820 LDX #8
830 LDY #227
840 JSR osbyte
850 :
860 .loop
870 LDA #remchar
880 LDX #serialin
890 JSR osbyte
```

Continued ▶

◀ Bartram's listing 1 continued

```
900 BCS chkkybd
910 TYA
920 JSR screen
930 :
940 .chkkybd
950 LDA #remchar
960 LDX #keybdin
970 JSR osbyte
980 BCS loop
990 CPY #128
1000 BCS command
1010 JSR convert
1020 .rs423
1030 LDA #inschar
1040 LDX #serialout
1050 JSR osbyte
1060 JMP loop
1070 :
1080 .command
1090 CPY #140
1100 BCC com2
1110 CPY #144
1120 BCS com2
1130 TYA
1140 SEC
1150 SBC #132
1160 TAY
1170 JMP rs423
1180 .com2
1190 CPY #137
1200 BNE com3
1210 LDA #2
1220 LDX #0
1230 JSR osbyte
1240 RTS
1250 .com3
1260 CPY #128
1270 BNE com4
1280 JMP oscmnd
1290 .com4
1300 JMP loop
1310 :
1320 .screen
1330 CMP #27
1340 BNE notesc
1350 LDA #255
1360 STA escflag
1370 RTS
1380 :
1390 .notesc
1400 BIT escflag
1410 BPL noesc
1420 CLC
1430 ADC #64
1440 PHA
1450 LDA #0
1460 STA escflag
1470 PLA
1480 :
1490 .noesc
1500 PHA
1510 JSR curpos
1520 CPY dh
1530 BEQ stilldh
1540 DEY
1550 CPY dh
1560 BNE clrdh
1570 LDA #255
```

Continued ▶

◀ Continued

```
1580 STA lfonly
1590 .clrdh
1600 LDA #64
1610 STA dh
1620 .stilldh
1630 PLA
1640 CMP #32
1650 BCC controlcode
1660 BIT lfonly
1670 BPL anychar
1680 LDA #9
1690 JSR oswrch
1700 RTS
1710 .anychar
1720 CMP #141
1730 BNE notdh
1740 PHA
1750 JSR curpos
1760 STY dh
1770 JSR duplicate
1780 PLA
1790 .notdh
1800 ORA #128
1810 STA char
1820 JSR oswrch
1830 LDA dh
1840 CMP #64
1850 BEQ chkbottomline
1860 LDA #8
1870 JSR oswrch
1880 LDA #10
1890 JSR oswrch
1900 LDA char
1910 JSR oswrch
1920 LDA #11
1930 JSR oswrch
1940 .chkbottomline
1950 JSR curpos
1960 CPY #24
1970 BNE notbottom
1980 LDA #30
1990 JSR oswrch
2000 .notbottom
2010 RTS
2020 :
2030 .controlcode
2040 BIT lfonly
2050 BPL control3
2060 CMP #30
2070 BEQ control1
2080 CMP #8
2090 BCC control2
2100 CMP #14
2110 BCS control2
2120 .control1
2130 PHA
2140 LDA #0
2150 STA lfonly
2160 PLA
2170 JMP control3
2180 .control2
2190 RTS
2200 .control3
2210 CMP #17
2220 BEQ iscursor
2230 CMP #20
2240 BEQ iscursor
```

Continued ▶

◄ Bartram's listing 1 continued

```
2250 CMP #8
2260 BNE notback
2270 JSR curpos
2280 CPY #0
2290 BNE backok
2300 CPX #0
2310 BNE backok
2320 LDA #31
2330 JSR oswrch
2340 LDA #39
2350 JSR oswrch
2360 LDA #23
2370 JSR oswrch
2380 RTS
2390 .backok
2400 LDA #8
2410 JSR oswrch
2420 RTS
2430 .notback
2440 CMP #11
2450 BNE notup
2460 JSR curpos
2470 CPY #0
2480 BNE upok
2490 LDA #31
2500 JSR oswrch
2510 TXA
2520 JSR oswrch
2530 LDA #23
2540 JSR oswrch
2550 RTS
2560 .upok
2570 LDA #11
2580 JSR oswrch
2590 RTS
2600 .notup
2610 CMP #8
2620 BCC ignore
2630 CMP #30
2640 BEQ home
2650 CMP #14
2660 BCS ignore
2670 .home
2680 JSR oswrch
2690 .ignore
2700 JMP chkbottomline
2710 :
2720 .iscursor
2730 AND #1
2740 PHA
2750 LDA #23
2760 JSR oswrch
2770 LDA #1
2780 JSR oswrch
2790 PLA
2800 JSR oswrch
2810 LDA #0
2820 LDX #8
2830 .vduloop
2840 JSR oswrch
2850 DEX
2860 BNE vduloop
2870 RTS
2880 :
2890 .curpos
2900 LDA #curxy
```

Continued ►

◄ Continued

```
2910 JSR osbyte
2920 RTS
2930 :
2940 .convert
2950 CPY #35
2960 BNE conv2
2970 LDY #95
2980 RTS
2990 .conv2
3000 CPY #95
3010 BNE conv3
3020 LDY #96
3030 RTS
3040 .conv3
3050 CPY #96
3060 BNE conv4
3070 LDY #35
3080 RTS
3090 .conv4
3100 CPY #13
3110 BNE conv5
3120 LDY #95
3130 .conv5
3140 RTS
3150 :
3160 .duplicate
3170 JSR curpos
3180 STX xpos
3190 STY ypos
3200 LDA #31
3210 JSR oswrch
3220 LDA #0
3230 JSR oswrch
3240 LDA ypos
3250 JSR oswrch
3260 :
3270 LDX #0
3280 .duploop
3290 TXA
3300 PHA
3310 LDA #rdscr
3320 JSR osbyte
3330 LDA #10
3340 JSR oswrch
3350 TXA
3360 JSR oswrch
3370 LDA #11
3380 JSR oswrch
3390 PLA
3400 TAX
3410 INX
3420 CPX #40
3430 BNE duploop
3440 :
3450 LDA #31
3460 JSR oswrch
3470 LDA xpos
3480 JSR oswrch
3490 LDA ypos
3500 JSR oswrch
3510 RTS
3520 :
3530 .oscmnd
3540 LDA #31
3550 JSR oswrch
3560 LDA #0
```

Continued ►

◀ **Bartram's listing 1 continued**

```
3570 JSR oswrch
3580 LDA #23
3590 JSR oswrch
3600 LDA #42
3610 JSR oswrch
3620 LDA #cmnd MOD 256
3630 STA osbuff
3640 LDA #cmnd DIV 256
3650 STA osbuff+1
3660 LDA #39
3670 STA osbuff+2
3680 LDA #32
3690 STA osbuff+3
3700 LDA #127
3710 STA osbuff+4
3720 LDX #osbuff MOD 256
3730 LDY #osbuff DIV 256
3740 LDA #0
3750 JSR osword
3760 :
3770 LDY #0
3780 .prntshift
3790 LDA shift,Y
3800 JSR oswrch
3810 INY
3820 CPY #36
3830 BNE prntshift
3840 :
3850 LDX #cmnd MOD 256
3860 LDY #cmnd DIV 256
3870 JSR oscli
3880 :
3890 LDY #0
3900 .prntspace
3910 LDA space,Y
3920 JSR oswrch
3930 INY
3940 CPY #11
3950 BNE prntspace
3960 :
3970 .waitspace
3980 JSR osrdch
3990 CMP #32
4000 BNE waitspace
4010 LDA #12
4020 JSR oswrch
4030 JMP loop
4040 :
4050 .shift
4060 OPT FNequs(CHR$(31)+CHR$(0)+CHR$(2
4))
4070 OPT FNequs("Press"+CHR$(133)+"SHIF
T")
4080 OPT FNequs(CHR$(135)+"to continue.
"+CHR$(14))
4090 OPT FNequs(CHR$(28)+CHR$(0)+CHR$(2
1)+CHR$(39)+CHR$(0))
4100 OPT FNequs(CHR$(31)+CHR$(0)+CHR$(2
1))
4110 .space
4120 OPT FNequs(CHR$(26)+CHR$(31)+CHR$(
6)+CHR$(24))
4130 OPT FNequs("SPACE"+CHR$(15)+CHR$(3
0))
4140 :
4150 .end
4160 ]
```

Continued ▶

◀ **Continued**

```
4170 NEXT pass
4180 ENDPROC
4190 :
4200 DEF FNequs(A$)
4210 $P%=A$
4220 P%=P%+LEN(A$)
4230 =pass
4240 :
4250 DEF PROCchecksum
4260 total%=0
4270 FOR byte%=code TO end-1
4280 total%=total%+?byte%
4290 NEXT byte%
4300 IF total%=78843 ENDPROC
4310 PRINT"Checksum Error - Check listi
ng"
4320 END
```

Listing 2. Links to scrolling databases such as Telecom Gold

```
 10 REM Scrolling Terminal
 20 REM by Graham Bartram
 30 REM & Dave Atherton
 40 REM for BBC B/B+/M
 50 REM (c) Acorn User June 1986
 60 :
 70 *TV 255
 80 *FX 229,1
 90 cmnd=&4000
100 osbuff=cmnd+40
110 code=osbuff+20
120 PROCassem
130 PROCchecksum
140 MODE 7
150 PRINT"Dial the computer and ";
160 PRINT"press";CHR$(133)"SPACE";
170 PRINTCHR$(135)"when"'
180 PRINT"you hear the carrier.";
190 REPEAT
200 UNTIL GET=32
210 ?autoxoff=1
220 ?manxoff=0
230 MODE 3
240 ON ERROR GOTO 290
250 CALL code
260 *FX 229,0
270 END
280 :
290 REM Error
300 CLOSE#0
310 PRINT'"Error : ";
320 P%=&FFFF AND !&FD
330 REPEAT
340 P%=P%+1
350 VDU ?P%
360 UNTIL ?P%=0
370 PRINT'
380 GOTO 240
390 :
400 DEF PROCassem
410 :
420 evntv=&220
430 cnpv=&22E
440 osfind=&FFCE
450 osbput=&FFD4
460 osbget=&FFD7
```

Continued ▶

◀ Bartram's listing 2 continued

```
470 osrdch=&FFE0
480 oswrch=&FFEE
490 osnewl=&FFE7
500 osword=&FFF1
510 osbyte=&FFF4
520 oscli =&FFF7
530 escflag=&70
540 autoxoff=&71
550 manxoff=&72
560 timer=&73
570 spool=&74
580 exec=&75
590 xon=17
600 xoff=19
610 keybdin=0
620 serialin=1
630 serialout=2
640 inschar=&8A
650 remchar=&91
660 :
670 FOR pass=0 TO 2 STEP 2
680 P%=code
690 [OPT pass
700 .init
710 LDA #0
720 STA escflag
730 STA spool
740 STA exec
750 LDA #event MOD 256
760 STA evntv
770 LDA #event DIV 256
780 STA evntv+1
790 LDA #14
800 LDX #4
810 JSR osbyte
820 LDA #7
830 LDX #3 \ 300 BAUD Rx
840 JSR osbyte
850 LDA #8
860 LDX #3 \ 300 BAUD Tx
870 JSR osbyte
880 LDA #2
890 LDX #2
900 JSR osbyte
910 LDA #156
920 LDX #20
930 LDY #227
940 JSR osbyte
950 :
960 .loop
970 LDA #remchar
980 LDX #serialin
990 JSR osbyte
1000 BCS chkkybd
1010 TYA
1020 JSR screen
1030 :
1040 .chkkybd
1050 LDA #remchar
1060 LDX #keybdin
1070 JSR osbyte
1080 BCS chkexec
1090 CPY #128
1100 BCS command
1110 JSR convert
1120 .rs423
1130 LDA #inschar
1140 LDX #serialout
```

Continued ▶

◀ Continued

```
1150 JSR osbyte
1160 JMP loop
1170 :
1180 .chkexec
1190 LDY exec
1200 BEQ noexec
1210 JSR osbget
1220 BCS closeexec
1230 TAY
1240 JMP rs423
1250 .noexec
1260 JMP loop
1270 :
1280 .closeexec
1290 LDY exec
1300 BEQ clexec2
1310 LDA #0
1320 STA exec
1330 JSR osfind
1340 .clexec2
1350 JMP loop
1360 :
1370 .command
1380 CPY #140
1390 BCC com2
1400 CPY #144
1410 BCS com2
1420 TYA
1430 SEC
1440 SBC #132
1450 TAY
1460 JMP rs423
1470 .com2
1480 CPY #137
1490 BNE com3
1500 LDA #2
1510 LDX #0
1520 JSR osbyte
1530 LDA #13
1540 LDX #4
1550 JSR osbyte
1560 RTS
1570 .com3
1580 CPY #128
1590 BNE com4
1600 JMP oscmnd
1610 .com4
1620 CPY #129
1630 BNE com5
1640 JSR stringin
1650 LDX #cmnd MOD 256
1660 LDY #cmnd DIV 256
1670 LDA #128
1680 JSR osfind
1690 STA spool
1700 JMP loop
1710 .com5
1720 CPY #130
1730 BNE com6
1740 LDY spool
1750 BEQ com5a
1760 LDA #0
1770 STA spool
1780 JSR osfind
1790 .com5a
1800 JMP loop
1810 .com6
```

Continued ▶

◀ Bartram's listing 2 continued

```
1820 CPY #131
1830 BNE com7
1840 JSR stringin
1850 LDX #cmnd MOD 256
1860 LDY #cmnd DIV 256
1870 LDA #64
1880 JSR osfind
1890 STA exec
1900 JMP loop
1910 .com7
1920 CPY #132
1930 BNE com8
1940 JMP closeexec
1950 .com8
1960 JMP loop
1970 :
1980 .screen
1990 AND #127
2000 LDY spool
2010 BEQ nospool
2020 JSR osbput
2030 .nospool
2040 CMP #27
2050 BNE notesc
2060 LDA #255
2070 STA escflag
2080 RTS
2090 :
2100 .notesc
2110 BIT escflag
2120 BPL noesc
2130 \
2140 \ Put any ESCAPE code
2150 \ handling here.
2160 \
2170 PHA
2180 LDA #0
2190 STA escflag
2200 PLA
2210 :
2220 .noesc
2230 CMP #32
2240 BCC controlcode
2250 JSR oswrch
2260 RTS
2270 :
2280 .controlcode
2290 CMP #xoff
2300 BNE notxoff
2310 JSR waitforxon
2320 RTS
2330 .notxoff
2340 CMP #13
2350 BNE notcr
2360 JSR osnewl
2370 RTS
2380 .notcr
2390 CMP #7
2400 BCC ignore
2410 CMP #14
2420 BCS ignore
2430 JSR oswrch
2440 .ignore
2450 RTS
2460 :
2470 .convert
2480 CPY #127
2490 BNE conv2
```

Continued ▶

◀ Continued

```
2500 LDY #8
2510 RTS
2520 .conv2
2530 CPY #xon
2540 BNE conv3
2550 LDA #0
2560 STA manxoff
2570 LDA #1
2580 STA autoxoff
2590 LDY #0
2600 RTS
2610 .conv3
2620 CPY #xoff
2630 BNE conv4
2640 LDA #1
2650 STA manxoff
2660 STA autoxoff
2670 RTS
2680 .conv4
2690 RTS
2700 :
2710 .oscmnd
2720 LDA #13
2730 JSR oswrch
2740 LDA #10
2750 JSR oswrch
2760 LDA #42
2770 JSR oswrch
2780 JSR input
2790 LDA #14
2800 JSR oswrch
2810 JSR osnewl
2820 LDX #cmnd MOD 256
2830 LDY #cmnd DIV 256
2840 JSR oscli
2850 JSR osnewl
2860 LDA #15
2870 JSR oswrch
2880 JMP loop
2890 :
2900 .input
2910 LDA #cmnd MOD 256
2920 STA osbuff
2930 LDA #cmnd DIV 256
2940 STA osbuff+1
2950 LDA #39
2960 STA osbuff+2
2970 LDA #32
2980 STA osbuff+3
2990 LDA #127
3000 STA osbuff+4
3010 LDX #osbuff MOD 256
3020 LDY #osbuff DIV 256
3030 LDA #0
3040 JSR osword
3050 RTS
3060 :
3070 .stringin
3080 JSR osnewl
3090 LDA #ASC(">")
3100 JSR oswrch
3110 JSR oswrch
3120 JSR input
3130 JSR osnewl
3140 RTS
3150 :
3160 .event
3170 PHP
```

Continued ▶

CONTROL	SHIFT	
		OS Command
		Spool ON
		Spool OFF
		Exec ON
		Exec OFF
		Exit to BASIC

Figure 1. Keystrip for scrolling terminal

◀ Bartram's listing 2 continued

```
3180 PHA
3190 TYA
3200 PHA
3210 TXA
3220 PHA
3230 JSR count
3240 CPX #40
3250 BMI event2
3260 LDA autoxoff
3270 BNE exit
3280 INC autoxoff
3290 LDY #xoff
3300 JMP event3
3310 .event2
3320 CPX #16
3330 BPL exit
3340 LDA autoxoff
3350 BEQ exit
3360 LDA #0
3370 STA autoxoff
3380 LDA manxoff
3390 BNE exit
3400 LDY #xon
3410 .event3
3420 LDA #inschar
3430 LDX #serialout
3440 JSR osbyte
3450 .exit
3460 PLA
3470 TAX
3480 PLA
3490 TAY
3500 PLA
3510 PLP
3520 RTS
3530 :
3540 .count
3550 CLC
3560 LDX #serialin
3570 CLV
3580 JMP (cnpv)
3590 :
3600 .waitforxon
3610 LDA #0
3620 STA timer
3630 .wait2
3640 LDA #xoff
3650 JSR osbyte
3660 LDA #remchar
3670 LDX #serialin
3680 JSR osbyte
3690 BCS wait3
3700 TYA
3710 AND #127
3720 CMP #xon
3730 BEQ wait4
3740 .wait3
3750 INC timer
3760 LDA timer
3770 BNE wait2
3780 .wait4
3790 RTS
3800 :
3810 .end
3820 ]
3830 NEXT pass
```

Continued ▶

◀ Continued

```
3840 ENDPROC
3850 :
3860 DEF PROCchecksum
3870 total%=0
3880 FOR byte%=code TO end-1
3890 total%=total%+?byte%
3900 NEXT byte%
3910 IF total%=62494 ENDPROC
3920 PRINT"Checksum Error - Check listi
ng"
3930 END
```

Entering listings

There are eight listings in this month's Joe's Jottings. None of these are particularly long so should prove easy enough to type in. The programs as they stand will work on a BBC B, BBC B+ and Master 128 (with DFS or ADFS) and with an Electron (with Plus 3).

Network users will have to make a few slight changes to some of Joe's programs to get the right results. This is because the NFS (and the ANFS) do not behave in quite the same way as the DFS and ADFS.

Listings 1 and 5 to 8 will work perfectly on network machines. Listing 2 will not be able to retrieve a drive number if run on network machines and so lines 300 and 350 should be deleted. For similar reasons, lines 300 and 340 should be deleted from listings 3 and 4 and lines 310 to 330 of both listings 3 and 4 should be changed to:

310 acc% = (?(rx% + 2 + ?(rx% + 1)))
320 ?(rx% + 2 + ?(rx% + 1)) = 13
330 title$ = $(rx% + 2)

The wizard of os, see page 96

Listing 1. Finds out which filing system is currently receiving our commands using the OSARGS call

```
10 REM Joe's Jottings - listing 1
20 REM OSARGS 0
30 REM by Joe Telford
40 REM for BBC B/B+/M/E
50 REM (c) Acorn User June 1986
60 :
70 osargs=&FFDA
80 Y%=0:A%=0
90 PROCdecode(USR(osargs) AND &FF)
100 END
110 :
120 DEF PROCdecode(A%)
130 RESTORE
140 DATA No Filing System
150 DATA CFS (1200 baud)
160 DATA CFS (300 baud)
170 DATA RFS (ROM)
180 DATA DFS (DISC)
190 DATA NFS (ECONET)
200 DATA TFS (Telesoft)
210 DATA IFS (IEEE)
220 DATA ADFS (Advanced DFS)
230 IF A%>8 OR A%<0 PRINT"Previously U
nencountered Filing system":ENDPROC
```

Continued ▶

JOE'S JOTTINGS

◀ **Listing 1 continued**

```
240 FOR x%=0 TO A%
250 READ fs$
260 NEXT
270 PRINT fs$" currently selected."
280 ENDPROC
```

Listing 2. Reads the media title, !Boot option and drive number

```
 10 REM Joe's Jottings - listing 2
 20 REM OSGBPB 5
 30 REM by Joe Telford
 40 REM for BBC B/B+/M/E
 50 REM (c) Acorn User June 1986
 60 :
 70 DIM blk% 16,rx% 32
 80 osgbpb=&FFD1
 90 PROCsetup
100 PROCcall(5)
110 PROCdecode
120 END
130 :
140 DEF PROCsetup
150 blk%!0=0:blk%!4=0
160 blk%!8=0:blk%!12=0
170 ENDPROC
180 :
190 DEF PROCcall(no%)
200 blk%?1=rx% MOD 256
210 blk%?2=rx% DIV 256
220 blk%?5=1
230 X%=blk% MOD 256
240 Y%=blk% DIV 256
250 C%=0:A%=no%
260 CALL osgbpb
270 ENDPROC
280 :
290 DEF PROCdecode
300 drv%=?(rx%+2+?rx%)
310 opt%=?(rx%+1+?rx%)
320 ?(rx%+1+?rx%)=13
330 title$=$(rx%+1)
340 PRINT"Media title  : "title$
350 PRINT"Drive        : "drv%
360 PRINT"Boot Option  : "opt%
370 ENDPROC
```

Listing 3. Reads current drive, the directory name and access rights

```
 10 REM Joe's Jottings - listing 3
 20 REM OSGBPB 6
 30 REM by Joe Telford
 40 REM for BBC B/B+/M/E
 50 REM (c) Acorn User June 1986
 60 :
 70 DIM blk% 16,rx% 32
 80 osgbpb=&FFD1
 90 PROCsetup
100 PROCcall(6)
110 PROCdecode
120 END
130 :
140 DEF PROCsetup
150 blk%!0=0:blk%!4=0
```

Continued ▶

◀ **Continued**

```
160 blk%!8=0:blk%!12=0
170 ENDPROC
180 :
190 DEF PROCcall(no%)
200 blk%?1=rx% MOD 256
210 blk%?2=rx% DIV 256
220 blk%?5=1
230 X%=blk% MOD 256
240 Y%=blk% DIV 256
250 C%=0:A%=no%
260 CALL osgbpb
270 ENDPROC
280 :
290 DEF PROCdecode
300 drv%=?(rx%+1)-48
310 acc%=(?(rx%+3+?(rx%+2)))
320 ?(rx%+3+?(rx%+2))=13
330 title$=$(rx%+3)
340 PRINT"Drive          : ";drv%
350 PRINT"Directory      : "title$
360 PRINT"Access         : ";
370 IF acc%=255 PRINT"Public" ELSE PRI
NT"Owner"
380 ENDPROC
```

Listing 4. Reads library drive, the library name and access rights

```
 10 REM Joe's Jottings - listing 4
 20 REM OSGBPB 7
 30 REM by Joe Telford
 40 REM for BBC B/B+/M/E
 50 REM (c) Acorn User June 1986
 60 :
 70 DIM blk% 16,rx% 32
 80 osgbpb=&FFD1
 90 PROCsetup
100 PROCcall(7)
110 PROCdecode
120 END
130 :
140 DEF PROCsetup
150 blk%!0=0:blk%!4=0
160 blk%!8=0:blk%!12=0
170 ENDPROC
180 :
190 DEF PROCcall(no%)
200 blk%?1=rx% MOD 256
210 blk%?2=rx% DIV 256
220 blk%?5=1
230 X%=blk% MOD 256
240 Y%=blk% DIV 256
250 C%=0:A%=no%
260 CALL osgbpb
270 ENDPROC
280 :
290 DEF PROCdecode
300 drv%=?(rx%+1)-48
310 acc%=(?(rx%+3+?(rx%+2)))
320 ?(rx%+3+?(rx%+2))=13
330 title$=$(rx%+3)
340 PRINT"Library Drive: ";drv%
350 PRINT"Library Dir  : "title$
360 PRINT"Access       : ";
370 IF acc%=255 PRINT"Public" ELSE PRI
NT"Owner"
380 ENDPROC
```

JOE'S JOTTINGS

Listing 5. Reads all files in the currently selected directory

```
 10 REM Joe's Jottings - listing 5
 20 REM OSGBPB 8
 30 REM by Joe Telford
 40 REM for BBC B/B+/M/E
 50 REM (c) Acorn User June 1986
 60 :
 70 DIM blk% 16,rx% 32
 80 osgbpb=&FFD1:item%=0
 90 PROCsetup
100 PROCcall(8)
110 PROCdecode
120 END
130 :
140 DEF PROCsetup
150 blk%!0=0:blk%!4=0
160 blk%!8=0:blk%!12=0
170 ENDPROC
180 :
190 DEF PROCcall(no%)
200 blk%?1=rx% MOD 256
210 blk%?2=rx% DIV 256
220 blk%?5=1
230 X%=blk% MOD 256
240 Y%=blk% DIV 256
250 C%=0:A%=no%
260 CALL osgbpb
270 ENDPROC
280 :
290 DEF PROCdecode
300 IF blk%?5>0 PRINT;item%" items, ac
cessed : ";?blk%;" times":ENDPROC
310 ?(rx%+1+?rx%)=13
320 fname$=$(rx%+1)
330 PRINT"Filename      : "fname$
340 item%=item%+1
350 PROCcall(8)
360 PROCdecode
370 ENDPROC
```

Listing 6. Reads details of all files and stores them for later use

```
 10 REM Joe's Jottings - listing 6
 20 REM OSGBPB 8a
 30 REM by Joe Telford
 40 REM for BBC B/B+/M/E
 50 REM (c) Acorn User June 1986
 60 :
 70 DIM blk% 16,rx% 32,fname$(50)
 80 osgbpb=&FFD1:item%=0
 90 PROCsetup
100 PROCcall(8)
110 PROCdecode:PROCprint
120 END
130 :
140 DEF PROCsetup
150 blk%!0=0:blk%!4=0
160 blk%!8=0:blk%!12=0
170 ENDPROC
180 :
190 DEF PROCcall(no%)
200 blk%?1=rx% MOD 256
210 blk%?2=rx% DIV 256
220 blk%?5=1
```

Continued ►

◄ Continued

```
230 X%=blk% MOD 256
240 Y%=blk% DIV 256
250 C%=0:A%=no%
260 CALL osgbpb
270 ENDPROC
280 :
290 DEF PROCdecode
300 IF blk%?5>0 PRINT;item%" items, ac
cessed : ";?blk%;" times":ENDPROC
310 ?(rx%+1+?rx%)=13
320 item%=item%+1
330 fname$(item%)=$(rx%+1)
340 PROCcall(8)
350 PROCdecode
360 ENDPROC
370 :
380 DEF PROCprint
390 FOR x%= 1 TO item%
400 PRINTfname$(x%),SPC(10);
410 NEXT
420 ENDPROC
```

Listing 7. Reads information about a given file (NB: WIDTH=41 for this listing)

```
 10 REM Joe's Jottings - listing 7
 20 REM OSFILE 5
 30 REM by Joe Telford
 40 REM for BBC B/B+/M/E
 50 REM (c) Acorn User June 1986
 60 :
 70 DIM oblk% 18,tx% 16
 80 osfile=&FFDD
 90 :
100 REPEAT
110 INPUT"Filename : "f$
120 PROCreadfileinfo(f$)
130 UNTIL FALSE
140 :
150 DEF PROCreadfileinfo(f$)
160 $tx%=f$
170 ?oblk%=tx% MOD 256
180 oblk%?1=tx% DIV 256
190 X%=oblk% MOD 256
200 Y%=oblk% DIV 256
210 A%=5
220 A%=(USR(osfile) AND &FF)
230 IF A%=0 PRINT"No such file":ENDPROC
240 IF A%=2 PRINT"This is a directory":
ENDPROC
250 IF A%=&FF PRINT"This is a Protected
*RUN only file":ENDPROC
260 PRINT"load address    : ";~oblk%!2
270 PRINT"Execute address: ";~oblk%!6
280 PRINT"Length          : ";~oblk%!&A
290 att%=oblk%?&E
300 PRINT"Owner Attributes      : ";
310 IF (att% AND 1) PRINT"Readable ";
320 IF (att% AND 2) PRINT"Writeable ";
330 IF (att% AND 8) PRINT"Locked ";
340 PRINT'"Other Users Attributes : ";
350 IF (att% AND 16) PRINT"readable ";
360 IF (att% AND 32) PRINT"writeable ";
370 IF (att% AND 128) PRINT"locked ";
380 PRINT
390 ENDPROC
```

Listing 8. A Boot file to help you choose the right directory (NB: WIDTH = 41 for this listing)

```
   10 REM Joe's Jottings - listing 8
   20 REM OSBOOT
   30 REM by Joe Telford
   40 REM for BBC B/B+/M/E
   50 REM (c) Acorn User June 1986
   60 :
   70 DIM oscar% 255,blk% 16,rx% 16,oblk%
 18
   80 DIM fname$(50),fatt$(50)
   90 oscli%=&FFF7
  100 osgbpb=&FFD1:osfile=&FFDD
  110 ON ERROR PROCerr
  120 dir$="$":path$=dir$
  130 REPEAT
  140 PROCreadfilesin(dir$)
  150 IF item%>0 PROCreadfileinfo
  160 choice%=FNmenu
  170 IF LEFT$(fatt$(choice%),4)=":BAS" T
HEN CHAINfname$(choice%)
  180 IF LEFT$(fatt$(choice%),4)=":MEM" T
HEN PROCoscar("*RUN "+fname$(choice%))
  190 IF LEFT$(fatt$(choice%),4)=":PRO" T
HEN PROCoscar("*RUN "+fname$(choice%))
  200 IF LEFT$(fatt$(choice%),4)=":DIR" T
HEN PROCdirselect
  210 IF LEFT$(fatt$(choice%),4)="this" T
HEN UNTIL TRUE:PRINT'"Exit into "path$':E
ND
  220 UNTIL FALSE
  230 :
  240 DEF PROCdirselect
  250 dir$=fname$(choice%)
  260 dir$=LEFT$(dir$,INSTR(dir$," ")-1)
  270 IF dir$="" dir$=fname$(choice%)
  280 path$=path$+"."+dir$
  290 ENDPROC
  300 :
  310 DEF PROCerr
  320 IF ERR=17 ENDPROC
  330 REPORT:PRINT" at line ";ERL
  340 END
  350 :
  360 DEF PROCreadfilesin(dir$)
  370 PROCoscar("DIR "+dir$)
  380 item%=0
  390 PROCsetup:PROCcall(8):PROCdecode
  400 ENDPROC
  410 :
  420 DEF PROCreadfileinfo
  430 FOR x%=1 TO item%
  440 $rx%=fname$(x%)
  450 ?oblk%=rx% MOD 256
  460 oblk%?1=rx% DIV 256
  470 X%=oblk% MOD 256
  480 Y%=oblk% DIV 256
  490 A%=5:A%=(USR(osfile) AND &FF)
  500 extn$=":MEM:"
  510 IF A%=2 extn$=":DIR:"
  520 IF A%=&FF extn$=":PRO:"
  530 exadr%=(oblk%!6 AND &FFFF)
  540 IF extn$=":MEM:" THEN IF exadr%=&80
19 OR exadr%=&8023 OR exadr%=&802B extn$=
":BAS:"
  550 IF extn$=":MEM:" THEN IF exadr%=&B8
19 OR exadr%=&B823 OR exadr%=&B82B extn$=
":BAS:"
```

Continued ▶

◀ Continued

```
  560 IF extn$=":MEM:" THEN IF oblk%!2=0
AND exadr%=&FFFF extn$=":DAT:"
  570 IF extn$=":MEM:" THEN IF oblk%!2=0
AND exadr%=0 extn$=":DAT:"
  580 att%=oblk%?&E
  590 IF (att% AND 1) extn$=extn$+"R"
  600 IF (att% AND 2) extn$=extn$+"W"
  610 IF (att% AND 8) extn$=extn$+"L"
  620 IF (att% AND 16) extn$=extn$+"r"
  630 IF (att% AND 32) extn$=extn$+"w"
  640 IF (att% AND 128) extn$=extn$+"l"
  650 fatt$(x%)=extn$
  660 NEXT
  670 ENDPROC
  680 :
  690 DEF PROCoscar($oscar%)
  700 X%=oscar% MOD 256
  710 Y%=oscar% DIV 256
  720 CALL oscli%
  730 ENDPROC
  740 :
  750 DEF PROCsetup
  760 blk%!0=0:blk%!4=0
  770 blk%!8=0:blk%!12=0
  780 ENDPROC
  790 :
  800 DEF PROCcall(no%)
  810 blk%?1=rx% MOD 256
  820 blk%?2=rx% DIV 256
  830 blk%?5=1
  840 X%=blk% MOD 256
  850 Y%=blk% DIV 256
  860 C%=0:A%=no%
  870 CALL osgbpb
  880 ENDPROC
  890 :
  900 DEF PROCdecode
  910 IF blk%?5>0 ENDPROC
  920 ?(rx%+1+?rx%)=13
  930 item%=item%+1
  940 fname$(item%)=$(rx%+1)
  950 PROCcall(8)
  960 PROCdecode
  970 ENDPROC
  980 :
  990 DEF FNmenu
 1000 CLS
 1010 fname$(item%+1)="Exit into ":fatt$(
item%+1)="this dir."
 1020 PRINT"    ";:PROCwhichfs
 1030 PRINT"    Directory Pathname: "path$
 1040 FOR x%=1 TO item%+1
 1050 PRINTTAB(40*((x%-1) MOD 2)),"    "CH
R$(64+x%);"....";fname$(x%);fatt$(x%);
 1060 NEXT:PRINT
 1070 PRINT"Which item? ";
 1080 REPEAT a$=GET$: UNTIL a$>"@" AND a$
<CHR$(65+item%+1)
 1090 PRINTa$
 1100 =ASC(a$)-64
 1110 :
 1120 DEF PROCwhichfs
 1130 RESTORE:OSARGS%=&FFDA
 1140 Y%=0:A%=0:A%=USR(OSARGS%) AND &FF
 1150 DATA No FS,CFS (1200 baud)
 1160 DATA CFS (300 baud),RFS (ROM)
 1170 DATA DFS (DISC),NFS (Econet)
```

Continued ▶

◀ Joe's listing 8 continued

```
 1180 DATA TFS (Telesoft),IFS (IEEE)
 1190 DATA ADFS (Advanced DFS)
 1200 IF A%>8 OR A%<0 PRINT"Previously Un
encountered FS ":ENDPROC
 1210 FOR x%= 0 TO A%:READ fs$:NEXT
 1220 PRINT fs$
 1230 ENDPROC
```

Program notes for Joe's listing 8

PROCdirselect *Reads the new directory from the single keypress (choice%) and adds to the pathname, so keeping track of the overall movement through the directories. Line 260 strips off any padded spaces after the filename.*

PROCerr *Handles simple errors, and allows the program to rerun if Escape is pressed.*

PROCreadfilesin *Calls the new directory, and then reads the filenames in it into the fname$() array. It uses PROCs setup, call(8) and decode to do this, as shown in OSGBPB 8a.*

PROCreadfileinfo *Based on the OSFILE 5 program, but builds up quite a sophisticated attribute list for each file in the directory. The list comprises a file-type, eg, DAT/MEM/BAS/PRO which indicates the type of file which OSBOOT thinks it has found, followed by the attributes: RWLrwl which comment on the files readibility/writeability and whether it is locked for owners and public access. Each file's attributes are added to the fatt$() list for later processing.*

PROCoscar *Basic 1 implementation of the OSCLI command found in later versions of BBC Basic to ensure the program works with earlier BBC micros.*

PROCs setup,call,decode *Detailed in OSGBPB 8a.*

FNmenu *Prints on a clear screen, the current filing system, the directory pathname, and all the files in that directory. Works automatically with 40 and 80 column screens. It then waits for a valid keypress and returns a matching number where A = 1 B = 2 . . . etc.*

PROCwhichfs *Based on OSFILE 5, it prints the name of the current filing system.*

The main body of the program *This is from line 120 to line 220. Line 120 always resets the current directory to the root directory. Within the REPEAT UNTIL loop, the filenames are read; the file info updated (if there are any files) and choice% from the keypress is recorded. Lines 170 to 210 decode that choice using the file type defined earlier. Notice that line 210 looks for the filetype 'this' which is actually part of the last alternative in the list of keypresses, remember this reads (for example: J... Exit into this directory). This string is actually inserted into the last plus one item of fname$() and fatt$() and it just so happens that the word 'this' is in the matching position to the other file types.*

Notice that we have to reserve space for Oscar, the OSCLI equivalent, for the OSGBPB 8a blocks and for the OSFILE block. Rather than use two blocks for OSFILE, We decided to use rx% for both the OSFILE filename holding block and for OSGBPB's return block. An elegant programmer would simply use Oscar as a single control area for all the OS calls, as they are used separately. Finally remember that fname$() and fatt$() can be adjusted to fit the maximum expected number of files.

See World Cup Database, page 102

Listing 1. A program to monitor the progress of the 24 teams in the World Cup

```
   10 REM World Cup Database
   20 REM by Bruce Smith & Dave Acton
   30 REM for BBC B/B+/M/E
   40 REM (c) Acorn User June 1986
   50 :
   60 MODE 4
   70 IF PAGE<>&1900 PRINT"Page must be se
t at &1900":END
   80 *FX 225
   90 PROCvars:PROCass
  100 d%=FNgetdate("Please enter today's d
ate")
  110 m%=d% DIV 32:d%=d% MOD 32
  120 IF FNyn("Have you saved a World Cup
datafile?") PROCload ELSE PROCinitdata
  130 ON ERROR IF ERR<>17 VDU 26,12:REPORT
:PRINT" at line ";ERL:END
  140 REPEAT:VDU 26,20,12
  150 PROCwdow(2,3,37,0):VDU 26
  160 PROCdcent(1,"Acorn User World Cup Da
tabase")
  170 VDU 20
  180 PROCmcent(6,"Date : "+FNdate(m%,d%))
  190 PROCmcent(8,"World Cup Database was
last updated on "+FNdate(fm%,fd%))
  200 VDU 28,0,31,39,10
  210 PROCopt(1,"Enter result")
  220 PROCopt(2,"View results")
  230 PROCopt(3,"View match calendar")
  240 PROCopt(4,"Enter 2nd round location"

  250 PROCopt(5,"Save data & quit")
  260 main%=FNch(5):VDU 26,12
  270 IF main%=1 PROCent
  280 IF main%=2 PROCresults
  290 IF main%=3 PROCcalendar
  300 IF main%=4 PROCloc
  310 UNTIL main%=5:CLS
  320 IF FNyn("Do you want to save the dat
a?") PROCsave
  330 MODE 6:END
  340 :
  350 DEF PROCvars
  360 DIM team$(24),loc$(12),round$(6)
  370 DIM gt%(4),gt$(4),gf%(4),ga%(4)
  380 DIM gpt%(4),gp%(4),gl%(4),gw%(4)
  390 DIM gd%(4),th%(6),thd%(6),thp%(6)
  400 FOR x=1 TO 24:READ team$(x):NEXT
  410 FOR x=1 TO 12:READ loc$(x):NEXT
  420 FOR x=1 TO 6:READ round$(x):NEXT
  430 team$(0)="?":match%=&900:ENDPROC
  440 :
  450 DEF PROCinitdata
  460 finl%=FALSE:mnum%=0:i%=match%-9
  470 RESTORE 4800
  480 REPEAT:i%=i%+9:READ ?i%
  490 IF ?i%=0 GOTO 530
  500 mnum%=mnum%+1
  510 FOR j%=1 TO 5:READ i%?j%:NEXT
  520 FOR j%=6 TO 8:i%?j%=0:NEXT
```

Continued ▶

◀ Smith and Acton's listing 1 continued

```
 530 UNTIL ?i%=0:fd%=28:fm%=5:ENDPROC
 540 :
 550 DEF PROCent
 560 PROCwdow(10,3,29,0):VDU 26
 570 PROCdcent(1,"Result Update")
 580 VDU 20,28,0,31,39,10
 590 nm%=FNmatch:na%=match%+9*(nm%-1)
 600 IF nm%=0 ENDPROC
 610 na%?7=FNval("How many goals did "+te
am$(na%?4)+" score?")
 620 na%?8=FNval("How many goals did "+te
am$(na%?5)+" score?")
 630 na%?6=1
 640 IF ?na%=1 PROCround1
 650 IF ?na%=2 PROCround2
 660 IF ?na%=3 PROCquarter
 670 IF ?na%=4 PROCsemi
 680 ENDPROC
 690 :
 700 DEF PROCround1
 710 any%=na%?4:gr%=1+(any%-1) DIV 4
 720 PROCcalcgroup(gr%)
 730 IF NOT fin% ENDPROC
 740 PROCdispgroup(gr%):RESTORE 5070
 750 FOR tm%=1 TO gr%:READ dt%,loc%
 760 NEXT:CLS:s%=match%-9
 770 REPEAT:s%=s%+9
 780 UNTIL s%?2=dt% AND s%?3=loc%
 790 IF s%?4=0 s%?4=gt%(1) ELSE s%?5=gt%(
1)
 800 RESTORE 5080
 810 FOR tm%=1 TO gr%:READ dt%,loc%
 820 NEXT:s%=match%-9
 830 REPEAT:s%=s%+9
 840 UNTIL s%?2=dt% AND s%?3=loc%
 850 IF s%?4=0 s%?4=gt%(2) ELSE s%?5=gt%(
2)
 860 PROCmcent(10,gt$(1)+" & "+gt$(2)+" g
o on to round 2")
 870 PROCany:PROCgroupfin:ENDPROC
 880 :
 890 DEF PROCgroupfin:allfin%=TRUE
 900 FOR gr%=1 TO 6:PROCcalcgroup(gr%)
 910 th%(gr%)=gt%(3):thp%(gr%)=gpt%(3)
 920 thd%(gr%)=gf%(3)-ga%(3)
 930 IF NOT fin% allfin%=FALSE
 940 NEXT
 950 IF NOT allfin% ENDPROC ELSE fin1%=TR
UE
 960 FOR a%=1 TO 5:FOR b%=a% TO 6
 970 IF thp%(a%)<thp%(b%) OR (thp%(a%)=th
p%(b%) AND thd%(a%)<thd%(b%)) PROCswapthir
d
 980 NEXT:NEXT:CLS
 990 PROCmcent(10,"The following 3rd plac
e teams qualify for round 2")
1000 FOR bs%=1 TO 4
1010 PROCcent(2+2*bs%,team$(th%(bs%)))
1020 NEXT:PROCany:ENDPROC
1030 :
1040 DEF PROCswapthird
1050 t%=thp%(a%):thp%(a%)=thp%(b%):thp%(b
%)=t%:t%=th%(a%);th%(a%)=th%(b%):th%(b%)=t
%
1060 t%=thd%(a%):thd%(a%)=thd%(b%):thd%(b
%)=t%
1070 ENDPROC
```

Continued ▶

◀ Continued

```
1080 :
1090 DEF PROCround2
1100 RESTORE 5090:PROCpromote:ENDPROC
1110 :
1120 DEF PROCquarter
1130 RESTORE 5130:PROCpromote:ENDPROC
1140 :
1150 DEF PROCsemi
1160 RESTORE 5150:PROCpromote
1170 s%=match%-9:REPEAT s%=s%+9
1180 IF ?s%=4 PROCthirdplay
1190 UNTIL ?s%=0:ENDPROC
1200 :
1210 DEF PROCthirdplay
1220 IF s%?7>s%?8 loser%=s%?5 ELSE loser%
=s%?4
1230 s2%=match%-9
1240 REPEAT:s2%=s2%+9:UNTIL ?s2%=5
1250 IF s2%?4=0 s2%?4=loser% ELSE s2%?5=l
oser%
1260 ENDPROC
1270 :
1280 DEF PROCpromote
1290 IF na%?7=na%?8 CLS:PROCmcent(15,"Mat
ch drawn - Re-enter result of replay"):PRO
Cany:na%?6=0:ENDPROC
1300 IF na%?7>na%?8 winner%=na%?4 ELSE wi
nner%=na%?5
1310 oldloc%=na%?3:olddt%=na%?2
1320 REPEAT:READ dt%,loc%,ndt%,nloc%
1330 UNTIL dt%=olddt% AND loc%=oldloc%
1340 s%=match%-9:REPEAT:s%=s%+9
1350 UNTIL s%?2=ndt% AND s%?3=nloc%
1360 IF s%?4=0 s%?4=winner% ELSE s%?5=win
ner%
1370 CLS:PROCmcent(15,team$(winner%)+" go
es on to the next round"):PROCany:ENDPROC
1380 :
1390 DEF PROCresults
1400 REPEAT:VDU 26,12
1410 PROCwdow(10,3,29,0):VDU 26
1420 PROCdcent(1,"World Cup Results")
1430 VDU 20,28,0,31,39,10
1440 PROCopt(1,"Individual result")
1450 PROCopt(2,"Results for given round")
1460 PROCopt(3,"Return to menu")
1470 res%=FNch(3)
1480 IF res%=1 PROCdispres(FNmatch)
1490 IF res%=2 PROCdispround(FNgetround)
1500 UNTIL res%=3:ENDPROC
1510 :
1520 DEF PROCdispres(m):IF m=0 ENDPROC
1530 CLS:i%=match%+9*(m-1)
1540 PROCdcent(1,round$(?i%)+", "+STR$(i%
?2)+"/"+STR$(i%?1)+"/86")
1550 PROCdcent(5,team$(i%?4)+" vs "+team$
(i%?5))
1560 PROCdcent(9,"Location : "+loc$(i%?3)
)
1570 IF i%?6=0 PROCdcent(13,"Result await
ed")
1580 IF i%?6>0 PROCdcent(13,team$(i%?4)+"
-"+STR$(i%?7)+" , "+team$(i%?5)+"-"+STR$(i
%?8))
1590 PROCany:ENDPROC
1600 :
1610 DEF PROCdispround(rd%)
```

Continued ▶

◀ Smith and Acton's listing 1 continued

```
1620 IF rd%=1 PROCdispfirst:ENDPROC
1630 s%=match%-9:suit%=0
1640 REPEAT:s%=s%+9:suit%=suit%+1
1650 IF ?s%=rd% AND s%?4>0 AND s%?5>0 PRO
Cdispres(suit%)
1660 UNTIL ?s%=0:ENDPROC
1670 :
1680 DEF PROCdispfirst
1690 REPEAT:CLS
1700 PROCcent(6,"Press A - F to select fi
rst-round group")
1710 PROCcent(8,"or R to return to the re
sults menu")
1720 REPEAT:*FX 15,1
1730 gp%=INSTR(" AaBbCcDdEeFfRr",GET$) DI
V 2
1740 UNTIL gp%
1750 IF gp%<7 PROCdispgroup(gp%)
1760 UNTIL gp%=7:ENDPROC
1770 :
1780 DEF PROCdispgroup(g)
1790 CLS:PROCcalcgroup(g)
1800 PROCdcent(1,"Group "+CHR$(64+g))
1810 PRINTTAB(0,5)"Team"TAB(12,5)"Plyd  W
  D  L   F   A    Pts"
1820 FOR t%=1 TO 4
1830 PROCmini(0,t%+17,gt$(t%))
1840 PRINTTAB(13,t%+7);gp%(t%)TAB(18,t%+7
);gw%(t%)TAB(21,t%+7);gd%(t%)
1850 PRINTTAB(24,t%+7);gl%(t%)TAB(28,t%+7
);gf%(t%)TAB(31,t%+7);ga%(t%)
1860 PRINTTAB(36,t%+7);gpt%(t%)
1870 NEXT:PROCany:ENDPROC
1880 :
1890 DEF PROCcalcgroup(g)
1900 tb%=4*(g-1)
1910 FOR t%=1 TO 4:gd%(t%)=0
1920 gt%(t%)=t%+tb%
1930 gt$(t%)=team$(t%+tb%)
1940 gp%(t%)=0:ga%(t%)=0:gf%(t%)=0
1950 gpt%(t%)=0:gw%(t%)=0:gl%(t%)=0
1960 NEXT
1970 s%=match%-9:REPEAT:s%=s%+9
1980 IF s%?4<tb%+1 OR s%?4>tb%+4 OR s%?6=
0 OR ?s%<>1 GOTO 2120
1990 t1%=s%?4-tb%:t2%=s%?5-tb%
2000 s1%=s%?7:s2%=s%?8
2010 gp%(t1%)=gp%(t1%)+1
2020 gp%(t2%)=gp%(t2%)+1
2030 gf%(t1%)=gf%(t1%)+s1%
2040 ga%(t1%)=ga%(t1%)+s2%
2050 gf%(t2%)=gf%(t2%)+s2%
2060 ga%(t2%)=ga%(t2%)+s1%
2070 IF s1%>s2% gw%(t1%)=gw%(t1%)+1:gl%(t
2%)=gl%(t2%)+1
2080 IF s1%<s2% gw%(t2%)=gw%(t2%)+1:gl%(t
1%)=gl%(t1%)+1
2090 IF s1%=s2% gd%(t1%)=gd%(t1%)+1:gd%(t
2%)=gd%(t2%)+1
2100 gpt%(t1%)=2*gw%(t1%)+gd%(t1%)
2110 gpt%(t2%)=2*gw%(t2%)+gd%(t2%)
2120 UNTIL ?s%=0
2130 PROCsortgroup:fin%=TRUE
2140 FOR t%=1 TO 4
2150 IF gp%(t%)<3 fin%=FALSE
2160 NEXT:ENDPROC
2170 :
```

Continued ▶

◀ Continued

```
2180 DEF PROCsortgroup
2190 FOR a%=1 TO 3:FOR b%=a% TO 4
2200 IF gpt%(a%)<gpt%(b%) OR ((gpt%(a%)=g
pt%(b%)) AND (gf%(a%)-ga%(a%))<(gf%(b%)-ga
%(b%))) PROCorder
2210 NEXT:NEXT:ENDPROC
2220 :
2230 DEF PROCorder
2240 t%=gp%(a%):gp%(a%)=gp%(b%):gp%(b%)=t
%
2250 t%=ga%(a%):ga%(a%)=ga%(b%):ga%(b%)=t
%
2260 t%=gf%(a%):gf%(a%)=gf%(b%):gf%(b%)=t
%
2270 t%=gpt%(a%):gpt%(a%)=gpt%(b%):gpt%(b
%)=t%
2280 t$=gt$(a%):gt$(a%)=gt$(b%):gt$(b%)=t
$
2290 t%=gt%(a%):gt%(a%)=gt%(b%):gt%(b%)=t
%
2300 t%=gw%(a%):gw%(a%)=gw%(b%):gw%(b%)=t
%
2310 t%=gd%(a%):gd%(a%)=gd%(b%):gd%(b%)=t
%
2320 t%=gl%(a%):gl%(a%)=gl%(b%):gl%(b%)=t
%
2330 ENDPROC
2340 :
2350 DEF PROCcalendar
2360 PROCwdow(8,4,31,1):VDU 26
2370 PROCdcent(2,"Match Calendar")
2380 VDU 20,28,0,31,39,10
2390 PROCtimesort
2400 CLS:s%=match%-9:vpos%=11
2410 REPEAT:s%=s%+9
2420 IF ?s%=0 GOTO 2460
2430 PROCmini(2,vpos%,FNfixture(s%))
2440 vpos%=vpos%+1
2450 IF vpos%=29 PROCany:CLS:vpos%=11
2460 UNTIL ?s%=0
2470 PROCany:ENDPROC
2480 :
2490 DEF PROCtimesort
2500 PROCmcent(15,"Sorting matches into c
hronological order")
2510 FOR m1%=1 TO mnum%-1
2520 a1%=match%+9*(m1%-1)
2530 FOR m2%=m1%+1 TO mnum%
2540 a2%=match%+9*(m2%-1)
2550 d1%=32*a1%?1+a1%?2
2560 d2%=32*a2%?1+a2%?2
2570 IF d2%<d1% PROCswap
2580 NEXT:NEXT:ENDPROC
2590 :
2600 DEF PROCswap
2610 FOR b%=0 TO 8:temp%=a1%?b%
2620 a1%?b%=a2%?b%:a2%?b%=temp%
2630 NEXT:ENDPROC
2640 :
2650 DEF PROCloc
2660 CLS:PROCwdow(5,4,34,1):VDU 26
2670 PROCdcent(2,"Second Round Locations"
)
2680 VDU 20,28,0,31,39,10
2690 IF fin1%=0 PROCmcent(10,"Not all fir
st round groups complete"):PROCany:ENDPROC
2700 PROCgroupfin:CLS
```

Continued ▶

◀ Smith and Acton's listing 1 continued

```
2710 PROCopt(1,"Enter location")
2720 PROCopt(2,"Return to menu")
2730 ch%=FNch(2):CLS
2740 IF ch%=2 ENDPROC
2750 FOR t%=1 TO 4
2760 PROCopt(t%,team$(th%(t%)))
2770 NEXT
2780 PROCmcent(25,"Which 3rd place team?"
)
2790 REPEAT:third%=(GET OR 16)-48
2800 UNTIL third%>0 AND third%<5
2810 third%=th%(third%):CLS
2820 PROCopt(1,"June 15, Aztec")
2830 PROCopt(2,"June 15, Leon")
2840 PROCopt(3,"June 16, Puebla")
2850 PROCopt(4,"June 16, Jalisco")
2860 PROCmcent(20,"At which location will
"+team$(third%)+" be playing")
2870 PROCmcent(22,"in the second round?")
2880 REPEAT thm%=(GET OR 16)-48
2890 UNTIL thm%>0 AND thm%<5
2900 RESTORE 5160
2910 FOR t%=1 TO thm%:READ thd%,thl%
2920 NEXT
2930 s%=match%-9:REPEAT:s%=s%+9
2940 UNTIL ?s%=2 AND s%?2=thd% AND s%?3=t
hl%
2950 IF s%?4=0 s%?4=third% ELSE s%?5=thir
d%
2960 ENDPROC
2970 :
2980 DEF FNfixture(ma%)
2990 fix$=FNdate(ma%?1,ma%?2)
3000 fix$=fix$+", "+round$(?ma%)
3010 fix2$=team$(ma%?4)+" vs "+team$(ma%?
5)
3020 =fix$+FNdots(60-LENfix$-LENfix2$)+fi
x2$
3030 :
3040 DEF FNdate(m,d):dt$=STR$d
3050 IF m=5 dt$=dt$+" May" ELSE dt$=dt$+"
June"
3060 =dt$+" 1986"
3070 :
3080 DEF PROCload:CLS
3090 in%=OPENIN"WCDATA"
3100 IF in%=0 PROCdcent(11,"Datafile does
not exist"):PROCinitdata:ENDPROC
3110 PROCdcent(11,"Loading data...")
3120 fd%=BGET#in%:fm%=BGET#in%
3130 mnum%=BGET#in%:fin1%=BGET#in%
3140 FOR b%=0 TO 9*mnum%
3150 b%?match%=BGET#in%
3160 NEXT:CLOSE#in%:ENDPROC
3170 :
3180 DEF PROCsave:CLS
3190 PROCdcent(11,"Saving data...")
3200 out%=OPENOUT"WCDATA"
3210 BPUT#out%,d%:BPUT#out%,m%
3220 BPUT#out%,mnum%:BPUT#out%,fin1%
3230 FOR b%=0 TO 9*mnum%
3240 BPUT#out%,b%?match%
3250 NEXT:CLOSE#out%:ENDPROC
3260 :
3270 DEF PROCdcent(y,t$)
3280 A%=&A:X%=&70:Y%=0
3290 PRINTTAB(20-LENt$/2,y);
```

Continued ▶

◀ Continued

```
3300 FOR t%=1 TO LENt$
3310 ?X%=ASCMID$(t$,t%)
3320 CALL &FFF1
3330 VDU 23,224,X%?1,X%!1;X%!2;X%!3;X%?4,
23,225,X%?5,X%!5;X%!6;X%!7;X%?8
3340 VDU 224,8,10,225,11
3350 NEXT:ENDPROC
3360 :
3370 DEF PROCwdow(L%,D%,R%,U%)
3380 VDU 24,L%*32-16;(31-D%)*32-16;(R%+1)
*32-16;(32-U%)*32-16;
3390 GCOL 0,129:CLG
3400 VDU 24,L%*32-12;(31-D%)*32-12;(R%+1)
*32-20;(32-U%)*32-20;
3410 VDU 20:CLG:COLOUR 0:COLOUR 129
3420 VDU 28,L%,D%,R%,U%:CLS:ENDPROC
3430 :
3440 DEF PROCcent(y,t$)
3450 PRINTTAB(20-LENt$/2,y)t$:ENDPROC
3460 :
3470 DEF PROCopt(n,o$)
3480 PRINTTAB(3,2*n);n;FNdots(34-LENSTR$n
-LENo$)o$:ENDPROC
3490 :
3500 DEF PROCany
3510 PROCcent(20,"Press any key to contin
ue..."):*FX 15,1
3520 any=GET:CLS:ENDPROC
3530 :
3540 DEF FNinputnum(n)
3550 REPEAT:k%=(GET OR 16)-48
3560 UNTIL k%>0 AND k%<=n:CLS:=k%
3570 :
3580 DEF FNval(q$):CLS
3590 PROCdcent(10,q$)
3600 REPEAT:PRINTTAB(0,13)SPC40
3610 INPUTTAB(19,13)v%
3620 UNTIL v%>=0 AND v%<=99:CLS:=v%
3630 :
3640 DEF FNyn(q$)
3650 CLS:PROCdcent(10,q$)
3660 PROCcent(13,"(Press Y or N)")
3670 REPEAT:yn%=INSTR(" NnYy",GET$)/2
3680 UNTIL yn%:CLS:=yn%-1
3690 :
3700 DEF FNch(n)
3710 PROCdcent(20,"Press 1 - "+STR$n+" to
select option")
3720 =FNinputnum(n)
3730 :
3740 DEF FNchooseteam
3750 FOR t%=1 TO 24
3760 PRINTTAB(1+20*((t%-1) DIV 12),3+(t%-
1) MOD 12);t%;FNdots(18-LENteam$(t%)-LENST
R$t%)team$(t%)
3770 NEXT
3780 PROCcent(16,"Enter 1 - "+STR$24+" to
select team")
3790 REPEAT:PRINTTAB(19,18)SPC40
3800 INPUTTAB(19,18)chm%
3810 UNTIL chm%>0 AND chm%<=24:=chm%
3820 :
3830 DEF FNgetround:CLS
3840 FOR x=1 TO 6:PROCopt(x,round$(x))
3850 NEXT
3860 PROCdcent(20,"Press 1 - 6 to select
round"):=FNinputnum(6)
```

Continued ▶

◄ Smith and Acton's listing 1 continued

```
3870 :
3880 DEF FNmatch
3890 PROCdcent(0,"Enter first team in mat
ch"):t1%=FNchooseteam
3900 CLS
3910 PROCdcent(0,"Enter second team in ma
tch"):t2%=FNchooseteam
3920 round%=FNgetround
3930 CLS:suit%=0:t%=match%-9
3940 REPEAT:suit%=suit%+1:t%=t%+9
3950 IF ?t%=0 PROCdcent(10,"No such match
"):PROCany:UNTIL TRUE:=0
3960 UNTIL ?t%=round% AND ((t%?4=t1% AND
t%?5=t2%) OR (t%?4=t2% AND t%?5=t1%))
3970 =suit%
3980 :
3990 DEF FNgetdate(q$)
4000 LOCAL d$,d,m
4010 PROCdcent(6,q$)
4020 PROCcent(9,"(Enter date and month in
 the form D/M")
4030 PROCcent(11,"where month is 5 <May>
or 6 <June>)")
4040 REPEAT:PRINTTAB(18,16)SPC10
4050 INPUTTAB(18,16)d$
4060 IF d$="" d$="30/6"
4070 d=VALd$:m=VALMID$(d$,LENSTR$d+2)
4080 UNTIL d>=1 AND ((m=5 AND d=31) OR (m
=6 AND d<=30))
4090 =d+32*m
4100 :
4110 DEF PROCmcent(y,$str%)
4120 VDU 5
4130 MOVE 20*(32-LEN$str%/2),28+(31-y)*32
4140 CALL mini:ENDPROC
4150 :
4160 DEF PROCmini(x,y,$str%)
4170 VDU 5:MOVE 20*x,28+(31-y)*32
4180 CALL mini:ENDPROC
4190 :
4200 DEF PROCass
4210 str%=&B00:code%=str%+64
4220 a=&70:b=&72:c=&74:v=&76
4230 ch=&78:t=&79:o%=&80
4240 FOR pass%=0 TO 2 STEP 2
4250 P%=code%:[OPT pass%
4260 .mini
4270 LDA #0:STA ch
4280 .miniloop
4290 LDX ch:LDA str%,X
4300 CMP #13:BEQ out:STA o%
4310 LDA #23:JSR &FFEE
4320 LDA #255:JSR &FFEE
4330 LDX #o% MOD 256:LDY #o% DIV 256
4340 LDA #&A:JSR &FFF1
4350 LDX #1
4360 .defloop
4370 LDA o%,X:AND #96:ASL A:STA t
4380 LDA o%,X:AND #12:ASL A:ASL A
4390 ADC t:STA t
4400 LDA o%,X:AND #1
4410 ASL A:ASL A:ASL A:ADC t
4420 JSR &FFEE
4430 INX:CPX #9:BNE defloop
4440 LDX #0
4450 .nextone
4460 LDA stream,X:JSR &FFEE
```

Continued ►

◄ Continued

```
4470 INX:CPX #7:BNE nextone
4480 INC ch:BNE miniloop
4490 .out
4500 LDA #4:JMP &FFEE
4510 .stream
4520 ]NEXT pass%
4530 ?P%=255:P%?1=25:P%?2=0
4540 P%!3=-12:P%!5=0
4550 ENDPROC
4560 :
4570 DEF FNdots(n):=STRING$(n,".")
4580 :
4590 DATA Italy,Bulgaria,Argentina
4600 DATA "S Korea",Mexico,Belgium
4610 DATA Paraguay,Iraq,France,Canada
4620 DATA USSR,Hungary,Brazil,Spain
4630 DATA Algeria,"N Ireland"
4640 DATA "W Germany",Uruguay,Scotland
4650 DATA Denmark,Poland,Morocco
4660 DATA Portugal,England
4670 :
4680 DATA "Aztec Stadium, Mexico City"
4690 DATA "Olimpico, Mexico City"
4700 DATA Puebla,Toluca,Leon,Irapuato
4710 DATA "Jalisco, Guadalajara"
4720 DATA "'March 3rd', Guadalajara"
4730 DATA "Technologico, Monterrey"
4740 DATA Queretaro,Neza
4750 DATA "Universitario, Monterrey"
4760 DATA "First Round","Second Round"
4770 DATA Quarter-Finals,Semi-Finals
4780 DATA "Third Place",Final
4790 :
4800 DATA 1,5,31,1,1,2,1,6,2,2,3,4
4810 DATA 1,6,5,3,1,3,1,6,5,2,2,4
4820 DATA 1,6,10,3,1,4,1,6,10,2,2,3
4830 DATA 1,6,3,1,5,6,1,6,4,4,7,8
4840 DATA 1,6,7,1,5,7,1,6,8,4,6,8
4850 DATA 1,6,11,1,5,8,1,6,11,4,6,7
4860 DATA 1,6,1,5,9,10,1,6,2,6,11,12
4870 DATA 1,6,5,5,9,11,1,6,6,6,10,12
4880 DATA 1,6,9,5,9,12,1,6,9,6,10,11
4890 DATA 1,6,1,7,13,14,1,6,3,8,15,16
4900 DATA 1,6,6,7,13,15,1,6,7,8,14,16
4910 DATA 1,6,12,9,14,15,1,6,12,7,13,16
4920 DATA 1,6,4,10,17,18,1,6,4,11,19,20
4930 DATA 1,6,8,10,17,19,1,6,8,11,18,20
4940 DATA 1,6,13,10,17,20,1,6,13,11,18,19
4950 DATA 1,6,2,12,21,22,1,6,3,9,23,24
4960 DATA 1,6,6,9,22,24,1,6,7,12,21,23
4970 DATA 1,6,11,12,21,24,1,6,11,8,22,23
4980 DATA 2,6,15,1,0,0,2,6,15,5,0,0
4990 DATA 2,6,16,3,0,0,2,6,16,7,0,0
5000 DATA 2,6,17,2,0,0,2,6,17,12,0,0
5010 DATA 2,6,18,1,0,0,2,6,18,10,0,0
5020 DATA 3,6,21,7,0,0,3,6,21,12,0,0
5030 DATA 3,6,22,3,0,0,3,6,22,1,0,0
5040 DATA 4,6,25,1,0,0,4,6,25,7,0,0
5050 DATA 5,6,28,3,0,0,6,6,29,1,0,0,0
5060 :
5070 DATA 16,3,15,1,15,5,16,7,18,10,17,12
5080 DATA 17,2,18,1,17,2,18,10,17,12,18,1
5090 DATA 15,1,21,12,15,5,22,3
5100 DATA 16,3,22,1,16,7,21,7
5110 DATA 17,2,21,7,17,12,21,12
5120 DATA 18,1,22,1,18,10,22,3
5130 DATA 21,7,25,7,21,12,25,7
5140 DATA 22,3,25,1,22,1,25,1
5150 DATA 25,1,29,1,25,7,29,1
5160 DATA 15,1,15,5,16,3,16,7
```

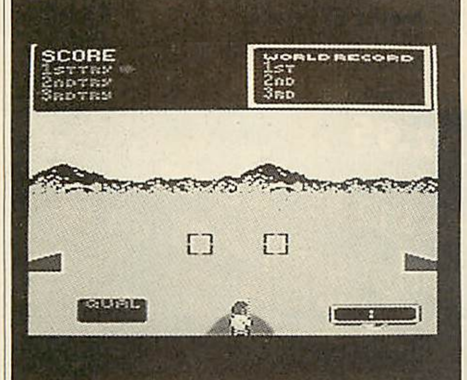


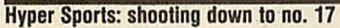
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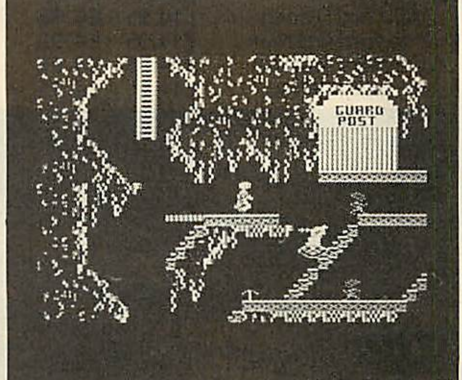
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TOP 20 BBC MICRO GAMES

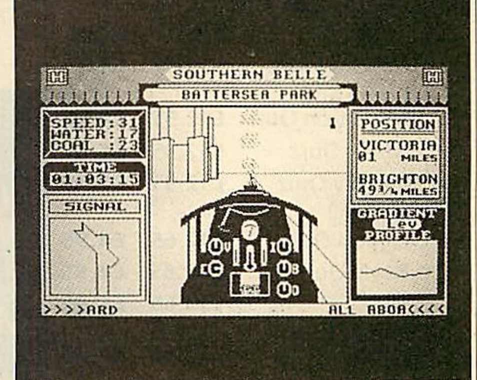
Title	Publisher	Cassette	Disc	B+	Master	Reviewed
1 (1) Yie Ar Kung Fu	Imagine	£9.95	£12.95	No	No	March '86
2 (2) Way of the Exploding Fist	Melbourne House	£9.95	–	Yes*	Yes*	April '86
3 (4) Strike Force Harrier	Mirrorsoft	£9.99	£12.99	Yes	No	January '85
4 (14) Phantom Combat	Doctorsoft	£9.95	£11.95	Yes	Yes	February '86
5 (3) Citadel	Superior	£9.95	£11.95	Yes	No	March '86
6 (7) Speech!	Superior	£9.95	£11.95	Yes	*	February '86
7 (–) Southern Belle	Hewson Consultants	£7.95	–	Yes*	No	June '86
8 (–) Lord of the Rings	Melbourne House	£15.95	–	*	*	–
9 (5) Repton 2	Superior	£9.95	£11.95	Yes	*	December '85
10 (–) Winter Olympics	Tynesoft			*	*	–
11 (–) Karate Combat	Superior	£8.95	£11.95	Yes	Yes	–
12 (–) Mini Office 2	Database	£14.95	–	*	*	–
13 (–) Dambusters	Sydney/US Gold	£9.95	£14.95	No	No	–
14 (8) Night Shade	Ultimate	£9.95	–	*	*	May '86
15 (6) Computer Hits 10	Beau Jolly	£9.95	–	Yes	No	–
16 (15) Combat Lynx	Durell	£8.95	–	Yes	*	September '85
17 (10) Hyper Sports	Imagine	–	£12.95	No	No	May '86
18 (–) Fleet Street Editor	Mirrorsoft	–	£39.95	Yes	Yes	May '86
19 (–) Computer Hits 10 Vol 2	Beau Jolly	£9.95	–	Yes	No	–
20 (12) Dr Who and the Mines of Terror	Micro Power	£18.95	£19.95	No	No	March '86




Hyper Sports: shooting down to no. 17



Dr Who: dropping out of the charts?



Southern Belle: steaming in at no. 7

TOP 10 ELECTRON GAMES

Title	Publisher	Cassette	Disc	Reviewed
1 (2) Yie Ar Kung Fu	Imagine	£8.95	–	March '86
2 (–) Way of the Exploding Fist	Melbourne House	£9.95	–	April '86
3 (–) Walk the Plank	Mastertronic	£1.99	–	–
4 (2) Computer Hits (10)	Beau Jolly	£9.95	–	–
5 (3) Beach-Head	Access/US Gold	£8.95	–	December '85
6 (4) Citadel	Superior	£9.95	–	March '86
7 (5) Spectipede	Mastertronic	£1.99	–	–
8 (–) Computer Hits 10 Vol 2	Beau Jolly	£8.95	–	–
9 (–) Star Maze 2	Mastertronic	£1.99	–	–
10 (–) Thai Boxing	Anco			–

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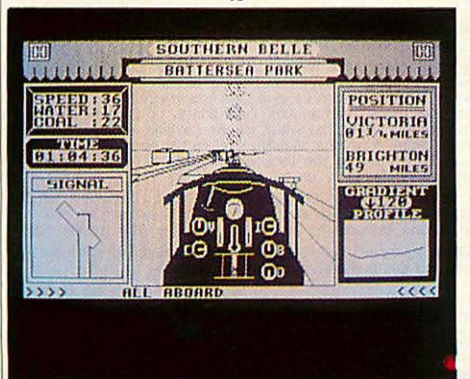
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REVIEWS

GAMES

STEAMING DOWN THE LINE

'Southern Belle', Hewson Consultants Ltd, BBC B and Electron, £7.95



This is a steam train simulation, written with loving care to recreate the journey from Victoria to Brighton as made by the famous Southern Belle in the 1930s. You spend your time on the footplate of a King Arthur class 4-6-0 locomotive, fiddling with your regulator, blower, dampers, injectors and firehole doors, shoving on coal, topping up the boiler, and all the time keeping one eye on the line ahead and the other on the timetable.

Whenever you do the trip you're given a different random selection of stations to stop at. Then there are speed limits to observe here and there. Then you have to make the most economical use of your coal and water. Then you have to remember to sound your whistle and open your blower when you approach a tunnel . . . The chores are endless.

You can play at seven levels, from a straightforward training session to a problem run, where you'll have to contend with things like dodgy brakes and ice on the line as well as everything else. At each level, you can choose how much control you have over the engine, leaving the micro to look after some of the controls if you wish.

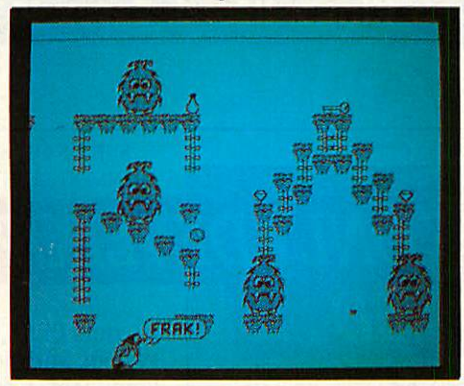
Every journey is strictly marked for safety, timekeeping and economy – and you don't get away with much. The full trip from Victoria to Brighton takes about an hour if you do it in real time (and stick to the timetable). You can speed it up at will, to rush you through the boring bits – but then everything happens so fast you'll never keep control of your locomotive. Me, I've never got further than Gatwick (where I was flunked for rolling backwards in the station. But I'm going to try again. It's a very compulsive program. **Jeffery Pike**

FRAK! ON THE ELECTRON!

'Frak!', Aardvark Software, Electron (£7.90) and BBC B (£8.90)

Frak!, a sideways-scrolling, incident-packed platform game, in which you guide little Trogg past a variety of monsters, dodging balloons and daggers, collecting keys and gems, in a seemingly never-ending search for the next level, is out for the Electron.

Electron *Frak!* reproduces all those little extras which made this game such a pleasure to play on the Beeb. For example: the ability to start on any of the levels and to save a good position; a choice of several colour combinations; a chance to design and save your own screens; instructions which help you play the game better; a chart of good times achieved for each level and a number to phone to check your times against others; smooth, detailed graphics and entertaining sound effects.



Despite minor problems in my pre-release copy, *Frak!* is clearly a thoughtfully designed game, and is one which had me forsaking all others for a week, but I have to admit to one slight disappointment: playing *Frak!* didn't turn out to be the heart-rending, nail-biting trauma I'd hoped. Perhaps this is more of a comment on me than on the game.

Not a game to excite real emotional involvement; more a cleverly designed puzzle and well worth the asking price on either machine.

Bernard Emblem

FAST AND FUNNY CAPERING

'Caveman Capers', ASL/Icon Software, BBC and Electron, £7.95



Whenever I come across a new game, the would-be ace programmer in me first wonders how it's been programmed. Anything new? Anything I could do? So I was immediately prejudiced against *Caveman Capers*, with its crude 2D graphics, long-winded death scenes and dreadful sound effects. It was then I noticed everyone else seemed to love the thing.

All around me queues were forming, queues of games players reacting to *Caveman Capers* as a game, not as a program. And as a game, it's absolutely superb.

Just three controls are used to manoeuvre Ogg the Caveman, who's trying to use a turtle as a skateboard, while jumping over toadstools, barrels, holes and frogs, and dodging under snakes, pterodactyls, and dinosaurs in a garish, fast-moving landscape. It makes an ideal family game, since players are able to master early levels using just the jump key, while those with loftier ambitions soon find that an ability to cope with more than one key at a time is essential for further progress. Dodging under pterodactyls while leaping over holes, for example, needs accurate positioning using the Z and X keys before jumping with Return, and some obstacles come so fast it's vital to take a running jump at them. The game proves incredibly difficult as the skateboard picks up speed, and, I've only seen a few of its 60 levels.

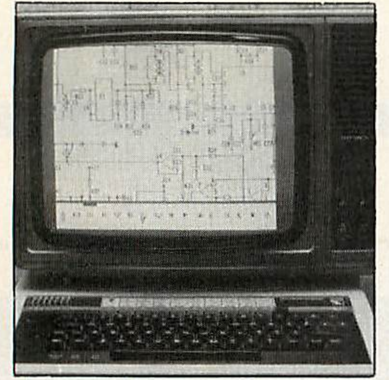
Caveman Capers: the programming may be rough and ready but as a game it's fast and it's funny. They like it! **Bernard Emblem**

PINEAPPLE SOFTWARE

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HARDWARE/SOFTWARE

THE TRUTH, THE WHOLE TRUTH...

Jeffery Pike winds himself up and discovers biofeedback



Biogram is a relatively cheap and reliable experimental tool for serious users

Biogram, Synergy Software, BBC B and B+, £37.95 (disc or cassette plus hardware)
This ingenious package is variously described by the manufacturers as a relaxation trainer, a lie detector and – most pithily of all – a galvanic skin response biofeedback detector. That all sounds rather alarming but it's not difficult to understand.

The hardware consists of a little box, about four inches by two by one, with a knob on one end and two wires coming out of the other. One wire plugs into the Beeb's 'analogue in' socket (where your joysticks go), and the other terminates in a pair of electrodes mounted on Velcro strips. Wrap these around two of your fingers with the electrodes against your skin, switch on the battery-powered unit, and you're ready to start transmitting biofeedback to your micro. So what's biofeedback? Be patient.

The software, available on disc or tape but much more convenient on disc, is a suite of programs designed to measure the biofeedback and display it in various forms. There are four programs called *Relaxogram 1-4*, a *Lie Detector*, a *Phobia Reducer* and a *Text Builder* for use with the last two. They all allow you to monitor your biofeedback in different situations. So what the hell's biofeedback?

It has nothing to to do with lentils and brown rice. It derives from the discovery made early this century that changes in the activity of the human nervous system are reflected by changes in the electrical conductivity of the skin. And what's more, that these changes (galvanic skin response or GSR) can be measured and translated to give clues to the nervous activity of the subject. That's just what this little package does – just like the bulky and expensive devices used in psychology labs and American police stations.

Put even more simply, it enables you to use your micro to measure the level of stress inside you. And very sensitive it is too. All the *Relaxogram* programs indicate whether the tension is rising or falling, and three of them allow for closer 'magnification', to register even the slightest change in stress. They use a numerical display and/or a graph plotted across the screen and/or a sound tone to show the changes moment by moment.

What can you do with the programs? It's up to you, of course, but the well-written user manual suggests all sorts of experiments you can try on your friends or yourself, for a better understanding of stress responses. Connect someone up, for instance, and let them settle down to a nice steady level. Then shout 'Boo!' – and watch the graph soar off the screen. Or tap a pencil on a table for a few minutes, and see how long it is before severe irritation and stress sets in. Or ask someone to spell his name backwards or do a difficult sum, and see how the mental effort causes nervous tension. There are plenty more where they came from.

The *Lie Detector* and *Phobia Reducer* programs take the same ideas a little further. The latter has a large store of trigger words, some of which are sure to produce a nervous response in most people.

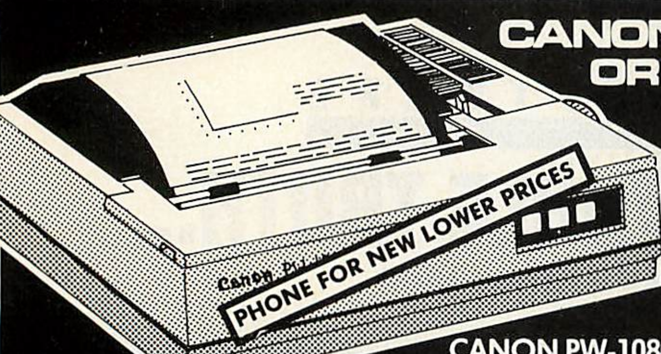
The micro plots your response as words like spider, flying, love and other frightening things are flashed on the screen. Or you can write words or phrases of your own, which the program will randomise before trying them out for their phobia factor.

Lie Detector does much the same. Use it to measure stress responses to awkward questions which you can either ask in person or arrange to appear on the screen. The manual gives some useful advice on how to use this program – but is at pains to point out that it should be used for 'interest and amusement' only. (Professional users of lie detector equipment have a whole range of sophisticated techniques at their disposal, and even then their findings won't always stand up in court.) Both *Lie Detector* and *Phobia Reducer* have clever options which allow you to examine the responses under different magnifications, to compare the anxiety graphs with the time that elapsed while the question was being answered, and to save the findings on tape or disc.

It's all very interesting, all very well programmed and all very easy to use. But does it really amount to anything more than a set of novelty games, perhaps something to play with at a particularly dull party? That's up to you. If you just want to play with it, it's a very expensive computer game and you'd probably have more fun (and more stress) with *Terrormolinos*. But if you're seriously interested in understanding anxiety responses in yourself and other humanoids, *Biogram* is a reliable and relatively cheap experimental tool.

It's also available as *Biogram II* (£47.95), in which the hardware incorporates a three-way sensitivity boost, which presumably makes it even more flexible and accurate. Both versions are available by mail order only, from Synergy Software, Dept 1, 7 St Andrews Close, Slip End, Luton, Beds LU1 4DE. Prices include postage and packing.

PHOTOGRAPH BY GEORGE LOGAN



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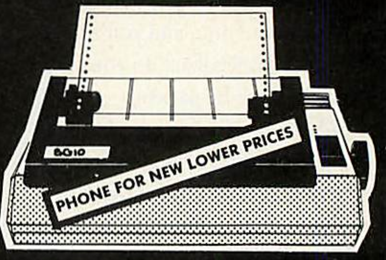


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PRINT QUALITY

HARDWARE/SOFTWARE

TESTING THE TEMPERATURE

Thermometer CTA21/23, Aleph One Ltd, £40 (single channel), £100 (multi-channel)

The use of thermistor probes to measure temperature is not new, and this model has no great physical advantages over others available. The unit is well made and simply plugs into the analogue port; local environment calibration takes place within the software.

The test unit came with three A4 sheets of printout containing descriptions of the software files, method of sampling the data and the general limitations and suitability of the thermometer for various applications.

As the manufacturer claims the unit is much better suited to recording slow changes in temperature, rather than rapid changes, and to test the unit in a realistic way, I took it to the school where I work and began trying it out with pupils in physics, chemistry and design technology lessons.

The software supplied comes in two basic forms and is unprotected so that the end user can modify it to suit his or her own needs. The display program gives a double-height mode 7 readout of the temperature, which can be switched from Celsius into Farenheit or Kelvin measurements.

There are two other options for 'direct' and 'maximum', but I had no notes on how to use them and when called, there was no change in the display to show if they were working.

The plot program will produce a real-time trace, with axes drawn as it goes and an option to be shown for a time in the display. The range of plotters which the software will drive are those using the same codes as the Tandy CGP115, which was the plotter that I used during the test.

You can control the paper feed speeds via the software and these are monitored for consistency of results while using the program.

However, if I had not been able to borrow the plotter from one of the children I would not have been able to test this part of the software package, as it is not designed to drive dot-matrix printers – if most schools are like mine, they'll probably not have both.

All in all then, the device works well, and is usable in the laboratory for producing graphs directly as well as being usable in Design Technology as a control monitoring device – just as long as you don't mind having a micro tied up for long periods! The main problem is the price. At £40 for a single channel, standard probe (and £100 for a multi-channel unit), a school can buy a lot of traditional thermometers – in my school, like most others these days, money is scarce, so I know which we'll be buying when September comes around.

Trev Buck

SCRATCHING FOR IDEAS

'Scratchpad', Innovative Software, £24.95 (disc only)

Bruce Smith, *Acorn User's* technical editor, sent me this program with a cryptic note saying it was right up my street. Whether this was to cast aspersions on the structure of my usual offerings to the magazine, or a subtle dig at my efforts to write 'creatively', I'll probably never know. *Scratchpad* is an 'ideas organiser' – in



effect a simple database composed of a number of 'cells', into which you can enter your ideas as they occur, without having to worry about how they inter-relate.

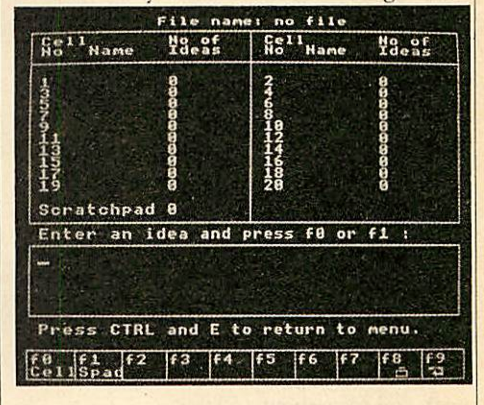
Once you've exhausted your psyche, you can look at what you've created and impose a structure on what may at first appear a jumble of random thoughts.

Imagine you are writing the synopsis of a textbook. You'll need to break down your subject into a number of general topics, and cover each in a separate chapter. Within each chapter you'll need to further subdivide your topics into specific points.

Getting all this into a well-constructed synopsis can be quite a headache. Using *Scratchpad*, though, you can short-circuit this process by separating the generation of ideas from their structuring into chapters.

Scratchpad works in screen mode 4, on a single or dual-disc system and is compatible with the 6502 second processor which is detected automatically. It offers 20 cells into which you can enter your ideas and these will normally represent general subject headings (the chapters of the synopsis) and may each contain up to 40 ideas (or up to 200 with a second processor).

Each idea consists of up to 95 characters and ideas can be entered in any order, as you think of them. If you think of something which



doesn't directly fit one of the subject headings of an existing cell, you can put it into the 'scratchpad', which is a separate cell reserved for the purpose.

Once the first flood of ideas is over you can view each cell, edit the ideas and reorder them or move them from one cell to another. You can also move ideas between named cells and the scratchpad.

Once you're satisfied with the wording and order of the ideas, you can reorder the cells themselves to form a complete, structured synopsis or article.

You can print out a complete list of the cells and their contents or create a *View*-compatible file for wordprocessing. This is fairly essential as you can only look at a few ideas within a cell at once which can make the restructuring of your ideas difficult.

Ideas, cell-names and other information are well organised on screen, with function key labels shown at the bottom of each display. The function keys are widely used, but there's a degree of inconsistency in their use. For example, <f1>, Returns and CTRL-E are all used at various points to escape from the current task.

Overall *Scratchpad* is a well-organised (as you'd expect!) utility which is valuable to writers of particular kinds of article or book.

I feel the market is actually rather smaller than Innovative Software imagines, but for those struggling writers who feel the need for an aid to structuring their work it could prove very useful indeed.

Simon Williams

COMMUNICATIONS

THE NEW BREED OF MODEMS

Jeff Ashurst looks at what's available in the modem market, especially in the higher price range aimed at business

In August last year we took a broad look at the communications scene to see what hardware and software was on the market. Of the dual-standard (V21 and V23) packages reviewed in what can loosely be described as the 'home user' price range, Pace's Nightingale and Miracle's WS2000, both at around £135-£140 inclusive of VAT, are still forces to be reckoned with this year, while GEC's Datachat, reviewed in this issue (see review opposite), sets new standards of usability for V23 systems, and costs about £50 less.

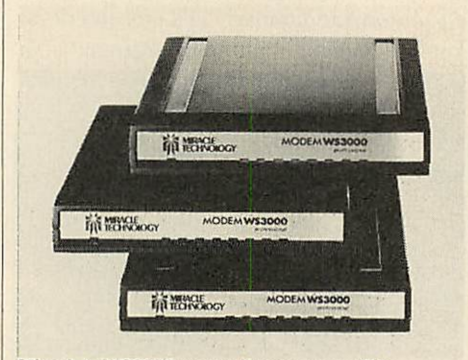
In a higher price bracket, from just under £300 right up to nearly £700 before adding VAT, a more sophisticated family of modems is now available, targetted principally at the business market.

Most of these products use a set of modem control commands known as Hayes protocols. Hayes protocols are *the* thing in modems this year. Hayes, a US modem manufacturer, was one of the – if not the – first companies to make a big impression with a really intelligent modem. As a result software packages utilising Hayes protocols were produced. Other modems followed suit using similar control protocols and generating more software. The inevitable spiral had started, and how manufacturers need to be compatible with Hayes protocols, at least to some degree, to take advantage of this pool of available software.

By 'intelligent' modem we imply a device with advanced capabilities over and above the mere transmitting and receiving of data. Capabilities which may include: auto-dial and auto-answer (of course – that alone would only be 'smart'), but also the ability to detect pulse or tone dialling and to configure accordingly; detect and adjust to the baud rate of the remote signal; comply with the transmission speed of the local computer, obviating the need to control this parameter in software; store a catalogue of online services with all information for automatic log-on; operate at V21/22/22bis/23 standards, respectively 300/300, 1200/1200, 2400/2400, and 1200/75 bit/second receive and transmit respectively; allow the modem to be programmed to log on at a preset time, perform defined tasks (eg, download electronic mail to disc) and then log off again.

These intelligent modems can be considered as computers in their own right, having their own microprocessor and being dedicated to the communications' function. Many communications companies have entered this market area, notably:

- Tandata, one of the founding core of British modem manufacturers. The Tm512 is a V21/V23 modem selling at £295, while the Tm602 V22 model costs £465, both prices exclusive of VAT.



Miracle's WS3000 range: Hayes compatible

- Miracle Technology, with its WS3000 range of three Hayes compatible models from the V21/23 version at £295, through the V22 (£495) to the V22bis model at £650, all prices excluding VAT. I was impressed with the company's WS2000 (*AU,* Aug '85), and am still hoping to bring you a review of its more sophisticated brother.
- Pace, another company at the heart of the comms scene, is to produce its Hayes-compatible Series IV range, with a V21/V23 version which will probably sell for about £270 plus VAT and including V22 & V22bis variants higher up the scale.
- DaCom, Steebeck and, of course, Hayes themselves are among others competing in this lucrative business market.

Meanwhile, coming back to the serious home user, I expect Hayes compatibility will percolate downwards. But before it does, a lot is happening, as a glance through this magazine's advertisement pages will show.

Pace's Nightingale, an excellent dual standard modem, has nevertheless been around a while, and it would not be surprising if an improved, Hayes-compatible version was to appear in the near future.

Pace is also likely to market a lower-priced modem, possible under £100. With this, the Nightingale and the Series IV, the company would be competitive at all levels.

In addition, Pace has been working on a modem board as an add-on for the Master series of Acorn micros.

Watford has introduced the dual standard Le Modem at £89 plus VAT, the description of which makes it sound like the Loco Systems SCM-100 (*AU,* Feb '85). The latter is no longer advertised: I wonder – we have seen the Demon Modem (*AU,* April '85) come and go and seemingly reappear. Datastar's Magic Modem, launched at £91.95 including VAT, has received some favourable press comment, although, like Le Modem, it has not, at the time of writing, been BABT approved.

Incidentally, Datastar's *Commpanion* software – pity, for Datastar, that the name *Commstar* was spoken for – was written by SoftMachinery, a prolific three-man consultancy whose handiwork is recognisable in other places, such as Acorn's Prestel Adaptor ROM, some Tandata software and SoftMachinery's own terminal ROM.

Still on software, Pace is now advertising a second generation 16k *Commstar* which should really be something if its famous 8k parent is anything to judge by.

In addition to the very readable user guide, a Technical Appendix is also offered for 'advanced users'. Tandata's current software includes Tan-Link to access viewdata and 80-column BT Gold.

If you are a prospective buyer it is preferable, as with most things, to have a demonstration of *exactly* how a particular package behaves in use, its strengths and weaknesses, and what the screen displays actually look like. Yes, it's boring to reiterate this sort of thing, but it's the best way to avoid disappointment with packages.

COMMUNICATIONS

GROWING TO LOVE THE DATACHAT

GEC has launched a modem for the home market, the Datachat 1223. Jeff Ashurst puts it to the test and finds it grows on him

GEC's modem is the Datachat 1223, a V23 1200/75 and reverse unit marketed with intelligent software either on 40- or 80-track disc or in ROM for cassette-based systems.

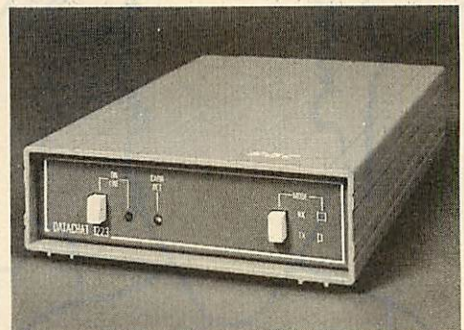
This package is suitable for use with Prestel and other viewdata displays, to access databases and electronic mail services such as Telecom Gold or to log on to the increasing number of bulletin boards with 1200/75 channels. For user to user links the software can be used to give, effectively, a 1200 bit/second (baud) capability in both directions.

This compact modem is unusual in that it takes its power from the telephone line – there is no mains connection.

The software makes extensive use of the function keys, to provide 29 operations for setting up and file control.

The disc holds the main program, which interacts with eight different service directory files, numbered 0 through 7, and a help file. This last file, 'comhelp', may be read as a text file, and even amended or added to, but principally it acts as a source file for the help pages and menus screens. Also provided is a telesoftware downloader with which I lifted routines off *Viewfax* directly onto disc at a single keystroke.

Now for those directory files which are the heart of the system. On booting the disc, file 0 is available, but the others may be accessed simply by stepping forwards or backwards using the right and left arrow keys respectively. Each of the eight can be programmed with the name, number and log-on sequences of up to six separate online services. It works like this. Select 4 – program service codes – from the top level menu to reveal a sub-menu screen of items numbered 1-6 on file 0. Initially most of the 48 entries on the eight files will be blank: the example reviewed had some PSS nodes, bulletin boards and the Prestel demo access details already entered. To add or change service details, select the relevant menu number and an input screen is presented to accept service name, telephone number, log-on sequence and comms codes. The existing entry is displayed, followed by an invitation to input a



GEC's Datachat 1223: easy to use

new entry: responding with Return at any point leaves that parameter unchanged.

Name and telephone number are self explanatory, but as the phone number is not used to auto log-on and so need not only contain digits, descriptions may be included.

Let's look now at the log-on codes. Here the character strings necessary to connect with the remote host are programmed. In the case of Telecom Gold, for example, this means the 'wake up' sequence CR/CR/A/2/CR/CR followed by the Network User Identity (NUI), Address (NUA), mailbox identity and personal password. For Prestel it would be ID and password, while for a bulletin board it would probably be name and town, sometimes with an optional password.

The relevant responses are programmed into the service directory as a string of characters, as when programming the Beeb's function keys. Delays should be incorporated into the sequence after each carriage return to allow the host to send its next prompt, again using the control symbol followed by a number specifying the delay in seconds, eg, CTRL-3 to build in a three second pause.

The final directory item to program is the four-digit comms code. Fully explained in the software user guide, this code fixes screen display mode (40col/80col/viewdata), sets word length and parity, enables/disables XON/XOFF and defines screen attributes such as echo and linefeed.

Option one of the top level menu – connect to database – leads to the service directory sub-menu, which will contain the names of services entered during the 'program service codes' phase. Choosing from options 1 through 6 now causes a help screen specific to the chosen services to be displayed, giving a reminder of the telephone number to call plus instructions to check the modem (off-line, Tx or Rx mode). Now you call the number, switch the modem on-line at the high-pitched tone and let the software take over. If all is well the screen will clear and the reassuring message '. . . connected . . .' is displayed, following which the log-on sequence, programmed as described earlier, will be sent.

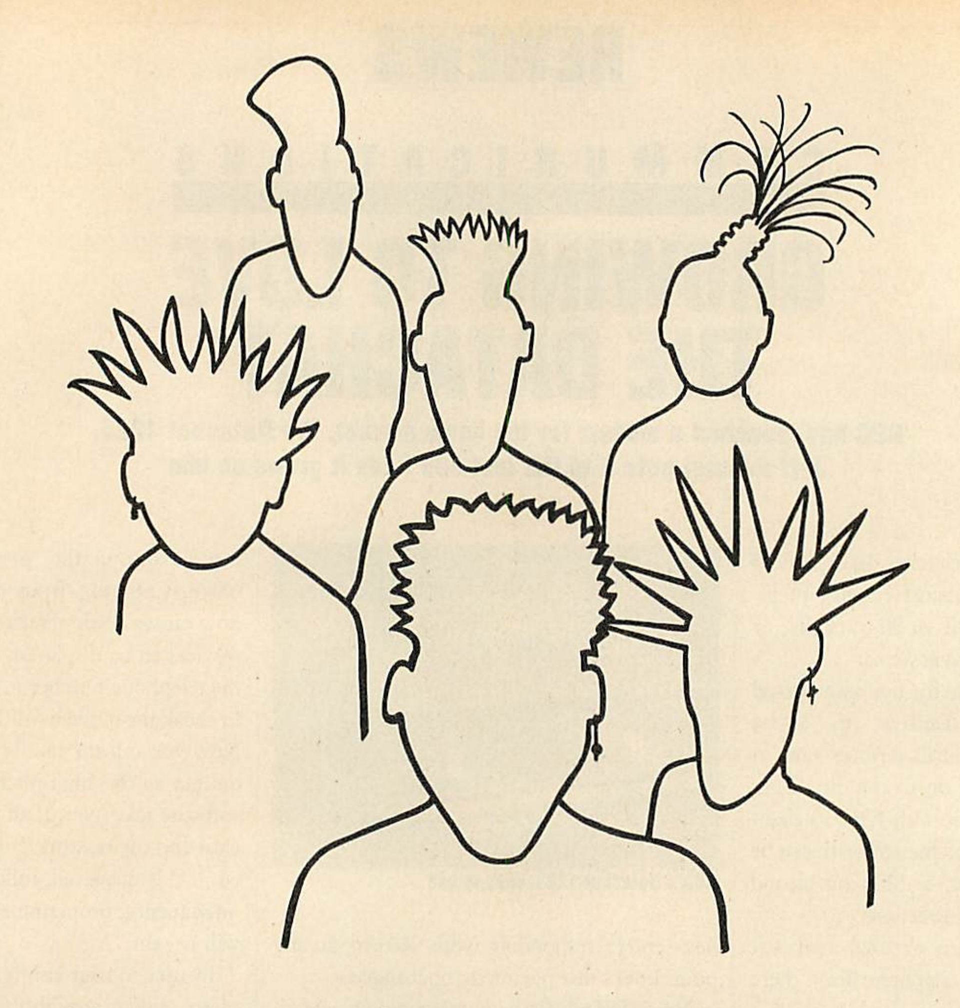
In user-to-user configuration, the software offers either straightforward chat mode – where characters entered at each keyboard also appear on the remote screen – and also disc-to-disc file transfer, with or without error detection. User-to-user mode has been well planned. Either user is able to send files directly from disc to disc or, knowing their names, to lift files from the remote disc, with all file opening and closing at both ends executed by the software. During contact, straightforward function key switching is provided between file transfer, interactive chat and voice modes.

With the ROM version and cassette storage the software uses a RAM buffer in the Beeb to transmit and receive files. User-to-user file transfer between disc and ROM versions is fully supported.

Conclusion

User-friendliness is the keynote of this package. At each stage you are presented with either a menu choice or a help screen of straightforward instructions. All prompts and warnings are informative, eg, 'carrier lost', 'check modem offline' or 'return to voice'. The literature, while not voluminous, is adequate and is written in an easy-to-follow style.

Overall, at a cost of £89.95 for the modem alone, or £99.95 for both the hardware and software, prices inclusive of VAT, the Datachat is a very attractive V23 system. I grew to love it more and more, and I recommend it as a worthwhile and, above all, easy to use package.



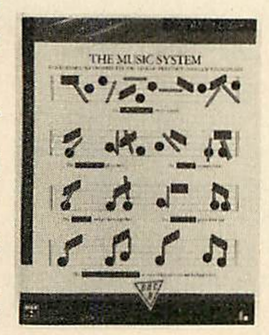
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MOUSE MASTERPIECES

Chris Steele paints an ecstatic picture of a package of graphics software for use with the Megamouse

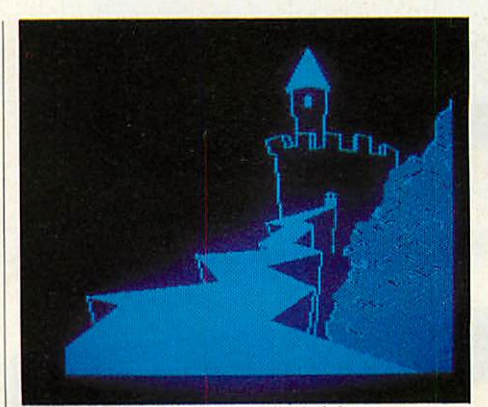
Producing computer graphics from the keyboard is at best tedious, at worst impossible. What is needed is a spatial input device which will allow you simply to 'point' at a location on the screen. One solution is the mouse.

A mouse fits into the palm of your hand and rests on any convenient flat surface. As you slide the mouse across the surface a rubber ball fitted into the underside of the mouse rotates, and this is picked up by spindles inside the mouse. Information about its X and Y movement is then passed to the computer, which the software uses as an input. One or more buttons on top of the mouse allow you to flag the mouse's present position. Once you have spent a few moments getting used to the action it becomes very natural – however, one fundamental drawback of using a mouse to input graphics is that you cannot trace over paper-based images as you might with a stylus.

The first thing that strikes you about the Megamouse from Wigmore House is the quality of its construction. It feels solid and operates smoothly and quietly making it a pleasure to use. It connects to the BBC micro's port, has three positive action buttons on its sloping front and is moulded to fit comfortably in your hand. The ball is coated in rubber which prevents it slipping.



These demonstration screens are supplied on disc


The castle in the deepest dark of night . . .


. . . is illuminated by a sudden flash of lightning

The Artist

The Artist, a 16k ROM painting package with an A4 manual, is the best graphics package I have ever seen on a micro. I've never written that before, and am highly critical of all graphics-orientated software (including my own). The reason you are going to want to buy the Megamouse is to be able to fork out even more to use *The Artist.* There is so much potential in this package that I know I will fail to describe everything it can do. Many of the functions can inter-react to such an extent that it would take several pages of 'hints and tips' to describe all the possibilities.

The copy I received to review included a disc with one or two utilities on it, some sample images, and a number of Basic programs full of tips on how to use the facilities in the ROM from Basic and machine code. A second disc contains a gallery of images, most of which are animated (by changing the palette). Some are quite superb and demonstrate the versatility of this software. Unfortunately, there is no way that a printed photograph of 'The Castle' will do justice to the dramatic effect of the flash of lightning.

Having plugged in your ROM, you enter *The Artist* with *ARTIST. The ROM examines any disc in drive 0 and then displays a mode 7 menu screen. This is the I/O menu from which you can load, save, lock, unlock or delete files of pictures, compressed pictures, sprites, brush shapes, fill patterns (called 'complex') and user functions. This menu also allows you to change drives, print pictures, catalogue the disc for any *Artist* files and issue operating system commands. You only have to resort to the keyboard if you need to specify a new file name – everything else is under the control of the mouse. For example, to load a picture into memory you position the mouse cursor over 'load' and press the left-hand button, then select 'picture' in the same way. A catalogue of picture files will then be displayed in the top third of the screen. Select one of these with the mouse, then press the left-hand and central buttons together to confirm your choice. The picture will then be loaded into memory and the software will immediately display the graphics screen.

All graphics are displayed on a mode 2 screen and your image fills the whole screen with no prompts, menus or icons to stop you using the full resolution. This is a distinct advantage as few other graphics packages allow you to create full screen images. On the graphics screen the left-hand button is the 'action' button, while the right-hand button displays other mode 7 menu screens: 'main menu' and 'special effects menu'.

The main menu allows you to switch between the different basic drawing styles and performs a number of other useful functions. Paper (background) and ink colours can be selected from the colour bar at the top of the page – only the eight solid colours are directly available from within *The Artist.* Both rubber band line drawing and freehand drawing are options, as are circle and ellipse. Unfortunately, the major and minor axes of the ellipse must be horizontal and vertical but these functions do allow you to see the shape before you fix it on your drawing.

To help in drawing accurate lines, switches can be selected which will inhibit the drawing of lines to the horizontal or vertical axes. A further tool to help in the accurate placement of lines is 'big cursor' which replaces the small

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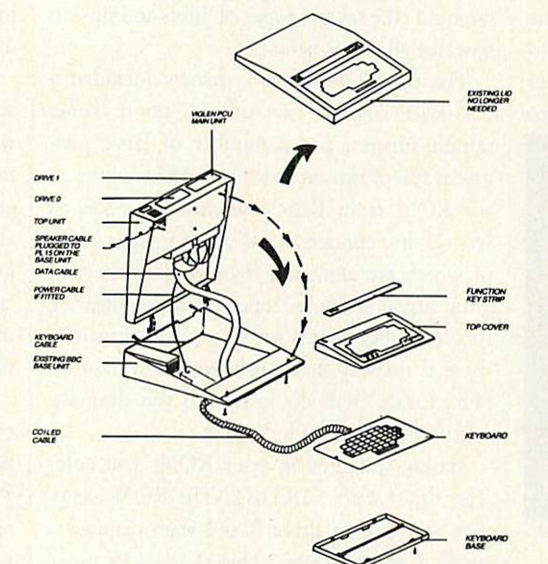


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cross cursor of the graphics page with a large cross-hair. Text can be written on to the screen horizontally or vertically and it's very easy to alter the size of the text by using a sort of 'menu-joystick' in the middle of the main menu (point at 'up' to increase the size and 'down' to decrease it).

The text size is always displayed on the main menu and can also be adjusted dynamically on the graphics screen.

Rectangles and triangles are also on the menu and, by additionally selecting the 'solid' switch, these (along with the circles and ellipses) will be filled rather than outlined.

To restrict drawing actions to a part of the screen only, you can define a screen window which can be cleared independent of the rest of the graphics window to the paper colour.



You can take a digitised portrait . . .

There is a useful function which allows you to remember a point on the screen and then use that in a later drawing operation.

Select 'remember CP' (current point) and then indicate a pixel on the graphics screen. When you return to the menu the co-ordinates of CP will be displayed. Now you can select 'use CP' and the software will take CP to be the first point in a drawing action (for example, the centre of a circle).

'Replace' will exchange all the background colour pixels in a rectangular area with the foreground (or ink) colour. 'Copy block' will copy a rectangular area of the screen, and do it very quickly. There is also a fast area fill routine which will fill complex shapes, and fill with a pattern if it has been selected from the effects menu.

Another function, 'big bits', allows you to zoom in on an area of the screen 17 pixels square and tinker with each pixel individually – I found this invaluable. The 'continuous' switch effectively makes the mouse buttons auto-repeat. Two further functions, 'time' and 'use size', control the use of certain functions selected from the effects menu.

Finally there is the ability to select your own functions which have to be loaded off disc (see later), or return to the I/O menu, and reset all these various switches to their initial values.

The effects menu offers a whole range of special facilities which really make this package stand out from the crowd. 'Cycle' will change the ink colour as you draw, cycling through any selection of colours at a rate chosen by 'time'. The function 'without' allows you to affect which colours are used by the copy function. A simple example is to select 'without black' and then copy one image on top of another. Any number of colours can be selected by 'without'.

A third colour control is 'over' which controls which colours can be plotted over all others or allow a number of colours to be plotted only if they are being plotted over another selection of colours. This is a very useful control, allowing you to mask irregular areas of the screen easily.

Up to eight brushes can be designed and used from the effects menu, each one being eight pixels square. Eight 'complex' patterns can also be created which can include any of the colours and can be used in conjunction with the fill, replace and brush commands. Not



. . . 'shave' the beard and alter background . . .

only can these patterns be any number of colours, but you can control their size, allowing you to repeat a pattern every fifth or seventh pixel (for example). This is one of the most powerful functions in the package.

Producing sprites is a real joy. Simply draw the shape (any number of colours, any size) on a blank screen then return to the I/O menu and use 'save' and 'sprite'.

The software only saves the sprite (not the whole screen) and an outline of the sprite. To use it, simply switch on 'sprite' and when you



. . . and manipulate the image

return to the graphics screen an outline of it will be attached to the cursor: one click and it is plotted. As I said earlier, many of these functions inter-react. As an example, the manual lists 12 functions which will affect the 'fill' routine in some way. Wigmore House tells me that the two programmers who wrote this package work for Welsh TV (some of our readers in Wales may have seen *The Artist* in action on television). This explains why many of the functions in the package mimic those found on the expensive commercial systems used by the television companies.

A series of Basic programs supplied on disc describes how you can write your own machine code 'user' functions for use within *The Artist*, and how to access the ROM routines from your own Basic programs. It took just a few minutes to have a mouse version of my *Freehand* software (see *AU*, Oct '85) up and running. Other programs explain how to expand 'compressed pictures', and how to use all 16 mode 2 colours for animation techniques. If you are looking for a mode 2 mouse-driven graphics package, this is the best I have seen and a lot better than I ever expected to see.

Yes, it is fairly expensive, but I believe it's worth every penny.

PRICES (excluding VAT)

Megamouse £59.90
The Artist £49.90
The Artist and **Megamouse** £99.90

Wigmore House states that the software is compatible with the BBC B and B+ and is available from:
Wigmore House Ltd, 32 Savile Row, London W1X 1AG. Tel: 01-734 0171; and
Pear Tree Computers Ltd, Falcon House, High Street, Huntingdon, Cambs PE18 6SS. Tel: (0480) 50595

SOFTWARE

HOLD THE FRONT PAGE

Tony Quinn tackles the AMX *Pagemaker* publishing package and measures it up against Mirrorsoft's *Fleet Street Editor*

'Welcome to the very wonderful AMX *Pagemaker*' – that's the opening message as you enter the main part of this publishing package, and it demonstrates the pride the authors have in it. *Pagemaker* comes across as a package by enthusiasts whereas *Fleet Street Editor* was done to a specification by professionals. Both are designed to produce finished pages of text and graphics which can be dumped on a printer and, with some limitations, they succeed.

They both have the problem of getting graphics in (you can create your own but it's a lengthy process), which *Fleet Street Editor* aims to tackle by providing a library of simple pictures to load in, with more on the way including Disney characters and letter fonts. *Pagemaker* is to get a disc full of logos and symbols for architects. Watford Electronics has coupled its digitiser to *Pagemaker* which makes it possible to load in video pictures, and could well do the same for *Fleet Street Editor*. A company called Thought Processors is running a digitising service for both packages.

After spending a good solid week playing around with the two, *Pagemaker* comes out on top, simply because it can do everything *Fleet Street Editor* can do but the reverse is not true; however, it has some drawbacks which might make you plump for the latter!

I took a good look at *Fleet Street Editor* last month, so let's go through *Pagemaker*. The package comes as two discs (40-/80-track) and two EPROM chips. This presents the first limitation of *Pagemaker*: you need a ROM board (unless you haven't got any other chips), and then you still need a disc drive – and I would suggest twin drives or you could be driven to distraction swapping discs. This means the package can't be carried around in your pocket as *Fleet Street Editor* can.

The ring-bound manual isn't a patch on *Fleet Street's* and there isn't anything to match Mirrorsoft's 'guided tour' for training. I mentioned the enthusiast approach, and *Pagemaker* has it on page 1 where you are obligingly told that it uses OSWORD 54 (whatever that is!). However, the nice side to this approach is on pages 5 and 6 where you're told which ROMs it works with and which give problems. Also, the chips can be downloaded into sideways RAM such as Solidisk. (The software will not function in machines with an Econet interface fitted, unless you remove the NFS).



Figure 1. Printer dump of Spiderman page on Mannesmann MT85 put together with Pagemaker. Note the 'dumpy' appearance of the characters compared with figure 3. Text at bottom was put into three windows, but corrections had to be done using graphics options. Spiderman title was executed using 'rubber-band' option with white 'ink' on solid filled box. 'Terror' headline is done in letter font loaded in from disc

Now into the software. The first thing you must do is boot (ie, Shift-Break) the system disc to call up the menu for the four parts. The first part, analogous to *Fleet Street's* 'administration section' is the set-up menu for printer (Epson RX/FX/LX/LQ is default, Canon PW1080, Kaga Taxan KP810, Mannesmann MT80+, Seikosha SP1000A and Star SD/SG as options), discs, etc.

Then you have to format discs specially to keep whole pages on. This is the big advantage

with *Pagemaker* – the A4 page is treated as one which you scroll up and down as it is pulled in from disc, rather than as eight separate panels with *Fleet Street*. Each page takes up 37.5k of disc space, although you can save a screen (20k), or a 'cut-out' of any size on a standard disc. Saving these is quick and easy, with the whole screen or page being the default – a much more friendly way of doing things than *Fleet Street*. Beware the scrolling however! As you scroll, the page is read back to disc, overwriting the original file.

Take a look at the Spiderman page (figure 1) and compare it with the Stun page from last month's review (figure 2). The gutter down the middle of *Fleet Street* cannot be got around, therefore you cannot plan a page with anything in the middle, but with *Pagemaker* this presents no such problem. The Stun page could be executed on *Pagemaker*, but *Fleet Street Editor* could not handle Spiderman.

A major drawback of *Pagemaker* comes to light after you've done all the hard work and



Figure 3. Non-distorted, full screen dump of main processor. About a third of the full A4 page is shown, and the full width. Menu icons on right are (from top): move page up; access to disc drive(s); paste (chosen) covering copy, stretch (half and double), rotate, flip and pixel editor; text for changing fonts, etc; graphics for drawing, painting and spraying; windows; printer dump; viewing (black box shows area of page on screen) and various 'goodies'; move page down. Options at top vary with each menu option chosen. The 'zoom' is in action here, the left in set showing the small box just above 'TERROR'



Figure 2. Stun page done using *Fleet Street Editor*. Page is put together from eight 'panels' which results in gutter down middle. *Fleet Street* has the advantage of its graphics library, from which girl in towel and Groucho were taken

printed your page, however. If you take a look at the non-distorted screen dummy of Spiderman in the graphics processor (figure 3) and compare him with the dump, you will see that he is 'squashed'. When you make a dump, you lose 10-20 per cent of the height so everything looks short and dumpy. I was very disappointed with this, and there is no warning (except in the section on circles which advises you draw them as ovals so they come out round!). I took a look back at *Fleet Street* and it, if anything, does the opposite, but not not nearly to such a marked degree.

There are two other options apart from the main graphics processor: a text font definer for letters (which Mirrorsoft is to release for *Fleet Street*) and a page previewer (figure 4), again similar to *Fleet Street*.

The main part of the program is shown in figure 3, and is called the Processor. This performs the functions of *Fleet Street's* Studio, Copy Desk and Page Make-up sections rolled into one. Selections are made from the icon menu on the right and from additional menus which appear at the top of the page. For a package which uses a mouse as standard I found the system of choosing options very poor as so many 'clicks' of the mouse are required (you need seven just to get past the title pages and into the processor from the menu). In *Fleet Street*, changing fills is just a matter of selecting an icon. *Pagemaker* requires you to stop painting, click for 'patterns', click to choose, click to pick a shade, click back out again and click into painting again. Also, the pixel editor (figure 3*) and copy options (needed for rubbing things out) are in the paste section rather than graphics so you have to go out then come back in again. The keyboard can be used with a combination of cursor and function keys, but it's much slower and the number of keys presses in tedious.

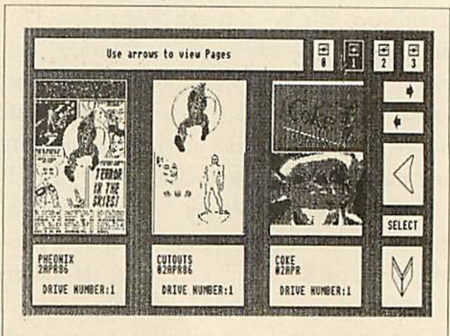


Figure 4. Page previewer showing three pages. 'Coke' and 'man' were in pulled in from past graphics in *Acorn User*

All in all, the graphics options for the two packages are similar with copying, enlarging and reducing, rubber-band line drawing, spraying, dot fills, boxes, circles, etc. *Pagemaker* has more fills and a 'ghosting' capability where things can be drawn 'behind'

SOFTWARE

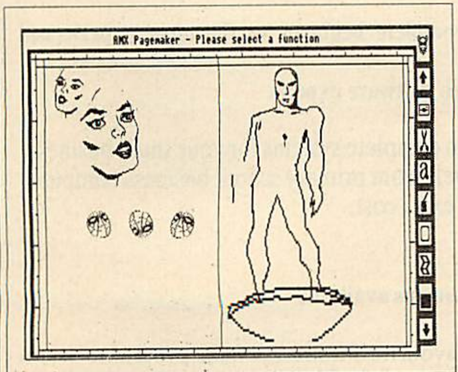


Figure 5. Initial sketches for Spiderman page. Surfer was halved in size. Spiderman's face was reflected and turned upside down

an object. *Fleet Street* wins on the pixel editor, though. It is interesting that it uses square pixels (in mode 4), whereas *Pagemaker's* are twice as tall as they are wide (in mode 0). This means that horizontal lines are twice as thick as vertical ones (see boxes in figure 1).

Where *Pagemaker* surprised me was in its 'typesetting' capabilities. Text editing is very crude compared to *Fleet Street*, but it has a range of 17 typefaces which can be blown up and shrunk even the character spacing can be changed. You can define as many text columns as you like using windows into which words are 'poured' from the keyboard or wordprocessed files. Then the quality of the characters is so much better with a larger matrix size for each letter. Once a chosen font is loaded in and a size selected, headlines can be just typed in, rather than being loaded in and positioned individually as with *Fleet Street*.

For Spiderman I used three typefaces: the 70-column serif at the bottom (serifs are the 'feet' at the top and bottom of the letter 'l' for example); standard 80-column text for the bubbles and captions (the bold was added using the pixel editor), and 'felt up' for 'Terror in the skies' (much reduced for Spiderman's 'but can I do it?').

The text at the bottom was typed in from the keyboard into three 'windows.' These can be set to any size. I made a mistake in the Spiderman text which I fixed using the graphics facilities. Take a look at the bottom, middle column, third line down. It originally read 'blank disc', so I moved the word 'disc' over and copied the bits to make up 'formatted' from other parts of the text. Notice that the 'a' and 'd' are different from the others because I made my own using the pixel editor. Also look at the thick bottom part of 'disc'; this was caused by the mouse. And I pressed the execute button on the mouse, it moved, thus copying it twice. This also happened on the windows of the building above the woman. For precise work, you're often better using the keyboard.

As with *Fleet Street*, words can be pulled in from *View* or *Wordwise* files. I experimented with this and it's easy, but time-consuming – three minutes to take in about 250 words. A file is simply loaded into a window and when that's full, you open another one. (I didn't use wordprocessed text for *Fleet Street* because the editor is good enough to cope with the small number of words in the panels.)

When it comes to printing out, the A4 Spiderman page took about nine minutes (*Fleet Street* pages took three). However, you can do half-size versions to three standards or dump just a section.

So, the big decision: *Fleet Street Editor* or *Pagemaker*? My choice would be *Pagemaker* because I know I would use the extra facilities for complicated page layouts – and I already have access to a mouse and ROM board.

'Pagemaker Plus', Advanced Memory Systems, BBC B/B+, £49.95, (two chips), two 40/80 discs), keyboard/joystick/AMX mouse compatible. Master version to be released on three discs for sideways RAM.

'Fleet Street Editor', Mirrorsoft, BBC B/B+/Master, £39.95, (two 40/80 discs). Keyboard/joystick compatible. (Reviewed in detail last month.) Three more discs are to be released mid-May by Mirrorsoft at £14.95 each – a set of Walt Disney characters, a font editor plus more graphics files, and some utilities.

Thought Processors will digitise a colour or black-and-white print or VHS video tape image and save it as a file on disc to add to Pagemaker. *It costs £1.50 excluding disc and postage from Thought Processors, 7-14 Greaves Place, Holywell Green, Halifax HX4 9BU.*

Watford Electronics, Jessa House, 250 Lower High Street, Watford. Tel: (0923) 37774, offers the Beeb Video Digitiser at £99 (unit, ROM and manual) or Magazine Maker at £125 for the Beeb Video Digitiser plus Pagemaker *package*.

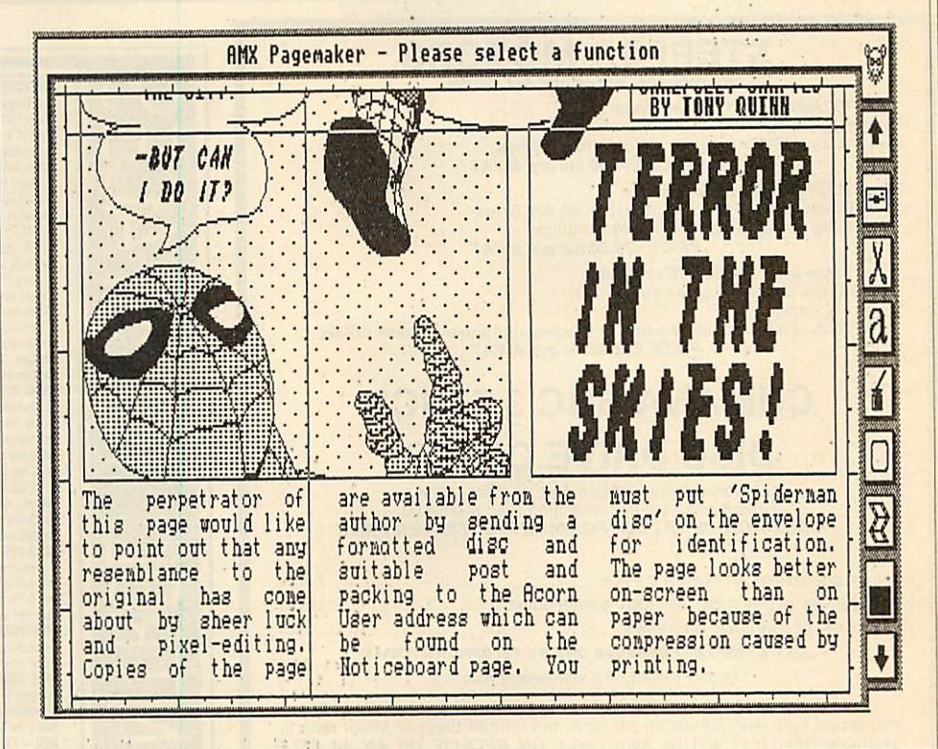


Figure 6. Screen dump of bottom of page

However, if you just want to do a fairly simple layout and don't want to stump out for the extra hardware (£80 for mouse and ROM board) then *Fleet Street* is good enough, and it has stacks of ready-made graphics to use.

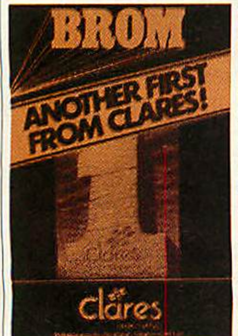
* *Figures 3-6 were done using the* UserDump *printer control* ROM.

If you would like a copy of either the 'Fleet Street Editor' or 'Spiderman' pages send me a blank formatted disc plus return post and packing. Note that you must have the relevant publishing package to display them. Mark the envelope Tony Quinn and 'Spiderman' or 'Stun' and send it to the address on page 3 of the magazine.

REVIEWS

SOFTWARE/ROM

BOX OF TOOLS



'BROM+' Clares Micro Supplies, £34.50

Clares released *BROM* toolkit ROM last year, putting much emphasis on its full screen scrolling editor which is extremely good, and gives you a *Wordwise*-like environment to develop your programs. Statements may be freely inserted and deleted using full screen-editing, and moving up and down the program listing is quick and smooth.

Its routines include a useful ROM control system, where a disabled ROM stays disabled even through a hard reset. Other goodies include a single key entry system (modelled on the Electron), a search and replace utility, display of variables with their current values and a program packer for squeezing wasted bytes out of your Basic.

BROM+ contains everything in *BROM,* plus 16 extra routines. The routines new to the 16k ROM are: *MEDIT edits memory, byte by byte; *MFIND searches through memory for a specified string. When found, it drops into the memory editor; *ROMLIST lists all ROMs in the micro, showing if they have service or language entry points; *DEDIT edits discs, a sector at a time. You can change bytes in ASCII or hex; *DFIND searches through a disc for a specified string, and then enters the disc editor; *DGET loads specific sectors from disc to a given address in memory; *DPUT puts them back again; *FORM formats up to four sides of a disc in one operation; *MENU displays a disc menu of programs stored in the '&' directory, any of which may be run directly.

Each file can also have a description attached to it, which may be displayed from the menu; *SHUT closes any open disc files; *UPDATE adds the descriptions used by the menu utility; *VERIFY checks the formatting of a disc; *XCOPY copies files selectively, from a menu; *XDEL deletes files selectively, from a menu; *RENUM renumbers sections of Basic programs; *XREF lists variables/arrays/procedures/functions in a program, giving all line numbers.

Some of the more interesting extras added to existing routines include the ability to turn off several ROMs with one command, to make a non case-specific search through a program, and to automatically form multi-statement lines when packing Basic.

The full-screen editor is smoother and faster than its competitor's *Toolkit Plus.*

Of the other utilities most are available in both ROMs. Having had both in my machine, I'm happier using *BROM+* when developing programs. A subjective choice, true, but with two closely-matched products it's difficult to choose otherwise. **Simon Williams**

SCREENS ON THE MOVE



'Teletext Control System', Promotional Art Work Systems, £19.95

The teletext screen control system from Promotional Art Work Systems consist of a pair of programs designed to allow the easy copying and editing of mode 7 screens, and their incorporation into a moving picture display.

The system is in two parts – the teletext screen editor and the animation control.

The teletext editor is comprehensive, but complex and is not made any easier by sketchy and badly thought out documentation.

The program is menu driven, though many of the menus are not easy to follow, due to their compression at the bottom of the page.

The screen is divided into three sections during editing. You have a source page and a destination page, and the idea is to copy as much as possible of a picture, and to make alterations only where necessary. The source page can be switched to contain a set of graphics symbols, and their lower case equivalents, which helps greatly in picture building. It is surprising how much of a picture you can build up in sections using a copy facility and source and destination pages. Text can be entered normally on the destination page. All colour and special character attributes (double-height, etc) are obtained from the appropriate menu via function key presses, with separate menus for text and graphics. The function keys only have one function at a time (unlike *View*), and you switch from one set of functions to another by pressing f0.

The top section of the screen contains the destination page, and the middle section the source page. The menu is at the bottom. The pages are displayed in sections which scroll automatically when you reach the bottom.

Once you have designed a screen it can be saved to disc or copied to another of the 'bank' of 10 current screens. I was horrified to find that it will only be in its final updated form if you have scrolled it just before saving or copying. The commands for designating source, destination, etc, are simple, but far from obvious.

When you have a set of screens ready, you can save them in blocks of five for later animation purposes. It is the animation phase of the operation which makes the previous effort worthwhile. It's possible to set up options which cause one picture to be replaced by another in a predefined way, and with a predefined delay time.

The 'wipe options' – replacement of one screen by another – include sliding the old page out in all directions to reveal the new page: the new page appearing overlapping the old; page peels and many others. All this is simple to manage, and with time and patience a complete 'slide show' of 50 frames can be built up. Frames can be displayed for times from 0.15 to 25 seconds. Loops of frames can be set up, giving an impression of cyclic movement.

The worst constraint is the absolute necessity of having the full complement of 50 screens available so that the animator can display them in turn. This can be circumvented when running the display by using the 'skip' option.

The system is *not* compatible with any second processor. The disc is protected, and cannot be transferred to an Econet disc easily. This means that you are not able to produce a copy of the master program on your file disc, and so have to swap discs.

This is a most capable and versatile system, spoiled by inadequate documentation and mediocre menu layout design.

George Hill



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INTERSHEET – The first of the ROM-LINK integrated rom packages from Computer Concepts. Menu driven, 40/80/105 column display, very fast, can be used with View or Wordeise, up to 16 spreadsheet in memory at one time. Supplied on two roms with reference manual, function key strip and quick reference card. **46.95 (a)**

INTERCHART – The second ROM-LINK package and designed for Intersheet giving Bar, Pie and Line graphs. **31.95 (a)**

INTERWORD – The new wordprocessor from Computer Concepts of the WYSIWYG type. Allows 40, 80 and 105 column mode. (available soon) **P.O.A.**

INTERBASE – The new rom-link database from Computer Concepts. (available soon). **P.O.A.**

ACCELERATOR – The most comprehensive compiler yet for the BBC micro. Compiles nearly all Basic, including floating point arithmetic. Compiles to intermediate G-code or to machine code. Comes on two roms with manual, disc and quick reference card. **57.95 (a)**

WORDWISE – The standard BBC word processor still very popular allowing all normal features for low cost. **30.95 (a)**

WORDWISE-PLUS – The new 16k version of Wordwise giving added commands for better use. Using its own language mail merging, indexing, continuous processing and multi column text can be utilised. **44.95 (b)**

TTS SPEECH ROM – This rom provides the most powerful and comprhensive speech system available for the BBC Micro. You can make your computer speak by simply typing in what you want to say. Requires Acorn Speech Processor. (Available soon) **36.95 (a)**

SPEECH ROM – Using the Phoneme system this allows infinte speech. Both pitch and emphasis can be changed and if wanted it can also sing. Requires the Acorn Speech Processor. **27.95 (a)**
Acorn Speech Processor – bought with above – 10.00 Otherwise 17.25 (a)

PRINTMASTER – This rom allows Epson or Star printers to be fully utilised easily. Includes a versatile screen dum, enlarged text, various text manimpulation commands. **27.50 (a)**

DISC DOCTOR – Still a very popular disc utility rom giving many extra commands to any DFS. **27.50 (a)**

ADVANCED DISC TOOLKIT – Probably the most versatile & compatible toolkit rom available. It works with the Electron, BBC B, BBC B+, Master, 6502, Z80, DFS, DNFS, 1770 DFS, ADFS. It ads more than 30 extra commands to the BBC. **33.00 (a)**

BEEB TEXT PLUS – A unique BBC Micro text-display enhancer. Ideal for eye-catching carousel displays. **19.95 (a)**

ADDCOM – A 'four-in-one' rom that adds forty new commands to BBC B and Electron computers. **25.00 (a)**

FLOPPYWISE PLUS – A very useful utility rom with a variety of new commands including Clone, Protect, Rom load and many more. **28.95 (a)**

BROM PLUS – Enhanced version of the original Brom allowing a whole host of additional commands. Still with the best full-screen editor available. **31.95 (a)**

BETABASE – A very useful database program allowing up to 65000 record to be held. Many features include versatile printing, powerful sorting routines, outputs can be compatible with Wordwise or View. **21.95 (a)**

BETABASE UTILITIES – Adds many more features to Betabase including full disc sort, mail merging and many more. **11.00 (a)**

REPLICA II – Now enhanced to transfer even more of your tapes to disc. Now uses a data disc so you need only to buy one copy. Even works with the BBC B+. **13.95 (a)**

BETA-ACCOUNTS – The first of this integrated suite of programs allows Invoices and Delivery notes to be issue. 80 Column editing, sales ledger sheet automatically generated, multiple VAT rates. Can be used with Betabase. **21.95 (a)**

PROFILE – A procedure library allowing up to 100 procedures on a disc, easy merging of procedures with basic programs. **11.00 (a)**

FONTWISE – A new font program allowing up to ten different fonts to be used with Wordwise or ascii text using an Epson compatable printer. **11.00 (a)**

FONTWISE PLUS – Enhanced version of the original Fontwise allowing more embedded commands. Now gives 12 fonts. **17.95 (a)**

WORDEASE – A utility disc for Wordwise-plus giving many new features to this best-selling wordprocessor. Includes label printing, disc menus, versatile copying routines etc. **Disc version 18.95 (a)**

SPELLCHECK III – A rom based spelling checker for both View and Wordwise. A dictionary of 76000 words is supplied which can be expanded to over 17000 on a 100k disc. Much faster than the original versions. **28.60 (b)**

TOOLKIT PLUS An updated version of the popular Toolkit rom including a syntax checker and a full screen editor comparable to any other available. **36.65 (a)**

HELP II — Now extended to 16k, contains ALL basic keywords, ALL VDU codes, ALL FX codes. **28.95 (a)**

SLEUTH – A comprehensive basic debugging rom. It allows single stepping of basic programs, dual screen facility, breakpoints etc. **26.25 (a)**

EXMON II – A very advanced machine code monitor which now includes dual screen facility and a full screen memory editor. Also includes single stepping and breakpoints. **26.25 (a)**

MASTERFILE II – A general purpose file management package allowing large amounts of its information to be stored and processed. **17.50 (a)**

VIEW – Version 2.1 of Acorns wordprocessor. Allows 80 column editing, printing direct from memory etc. **47.95 (a)**

VIEW PRINTER DRIVER GENERATOR – Allows you to tailor a printer driver to your own printer. Comes with drivers for FX80, Juki 6100, Olivetti JP101 and others.
Disc — 11.00 (a)
Cassette — 9.50 (a)

VIEW 3.0 – A version of View suitable for the BBC+. Comes with a cassette version of the Printer Driver Generator. **73.95 (b)**

HI-VIEW – A disc based version of this popular word processor for the 6502 second processor giving 47k of user memory. **44.95 (a)**

VIEWSHEET – Acorns spreadsheet rom giving 255 rows by 255 columns, multiple windows, works in any mode, wide use of function keys, fully compatible with View. **47.95 (a)**

VIEWSTORE – Acorns new database rom. Works in any screen mode, many powerful sorting facilities, can be spreadsheet or user defined card layout. max record size is 60k. Output can be sent to View and Viewsheet. Comes with comprehensive manual, utilities disc etc. **50.95 (a)**

VIEWSPELL — An automatic spelling checker using a dictionary of over 75,000 words. User dictionaries can also be created. (Available soon). **34.95 (a)**

VIEWPLOT – This rom will work with Viewsheet and Viewstore to draw bar graphs, line graphs and pie charts. (Available soon). **25.95 (a)**

GRAPHICS ROM — Acorns new 16k graphics rom giving many new commands for extensive graphics. Circles, ellipses, arcs, rectangles, parallelograms, segments and sectors etc are all available. Comes with manual and utility cassette. State B or B+ version. **25.95 (a)**

BASIC EDITOR — Acorns new editor rom allowing all the normal wordprocessor facilities to be used on basic programs. Features include block copy, block move and use of labels. **27.95 (a)**

TERMULATOR – A terminal emulation rom. Emulations provided are VT100, VT52, 4010, teletype, hardcopy and a special BBC terminal. Comes with user guide and a set of function key strips. **29.95 (a)**

ISO-PASCAL – A full implementation of the ISO standard supplied on two roms with two comprehensive guides. 6502 disc version also supplied. **54.95 (c)**

LOGO – A full implementation of the Logo language supplied on two roms. Comes with manuals, user guide, examples disc and reference card. **54.95 (c)**

COMAL — A full implementation of the International Standard for Comal. Comes with comprehensive manual. **44.95 (c)**



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Reference manual Part 1 (available soon)	14.95 (b)
Reference manual Part II	14.95 (b)
View 3.0 User Guide	10.00 (a)
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A top quality NLQ printer giving 150 c.p.s. draft and 27 c.p.s. NLQ. Fully FX80 compatible, friction and tractor feed as standard. Comes complete with cable and paper **219.00 (s)**

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A very versatile and fast printer giving 180 cps draft and 30 cps in NLQ mode. Friction & tractor feed as standard. Fully FX80 compatible. Comes with cable & paper. **219.00 (s)**

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A low cost daisywheel giving all the facilities you need. 20 cps, 13" paper, 4 hammer settings, daisywheels are Qume compatible, 10,12,15 cpi. Comes with cable & paper. Tractor & cut sheet feeder available. **139.00 (s)**

DWP1120 Tractor unit	109.00 (s)

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The mouse now comes with the new Super Art package. Now on a 16k rom it extends the original facilities to include Pull Down Menus, overlapping windows and extended Icon sets. It is now compatible with Aries ram boards, the BBC B+, DFS and ADFS. The mouse and Super Art are available either separately or as a package.

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AMX Pagemaker	47.95 (b)

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Acorn 1770 DFS		–48.95 (a)
Acorn ADFS		–28.95 (a)

PROFIT

A complete intergrated suite of business software for the BBC B (with shadow ram), BBC B+, Master 128 or KBL128PC. The system covers stock control, invoicing, credit notes, all ledgers, petty cash and bank account control and much more.
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ARTIST

The new colour graphics package from Pear Tree using the ultimate mouse – Megamouse. This powerful art package allows all the normal facilities as well as sprites of any size, pattern editing and colour exclusion. The package comes complete with a manual, rom software, system discs and an Epson screen dump.
The Artist package and the Megamouse can be bought separately or as a complete package.

Artist	53.00 (b)
Megamouse	65.00 (b)
Artist & Megamouse	97.00 (c)

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80tr d/s dual + psu	– 289.95 (s)
80tr d/s dual + psu in monitor stand	– 319.95 (s)

Cumana

80tr d/s single	– 134.95 (s)
80tr d/s dual	– 244.95 (s)
80tr d/s dual + psu	– 289.95 (s)

All drives come complete with manual, cables and formatting disc.

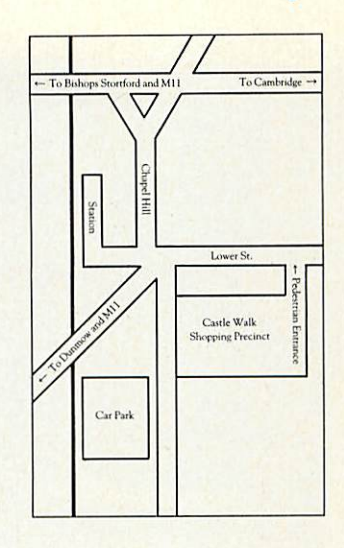
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Mitsubishi 1404 Med Res	265.00 (s)
Philips CF114 TV/Monitor	199.00 (s)
Kaga KX1201G Green Screen	103.00 (s)
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BUSINESS

NEWS

Stats packs rival

Two more packages have joined the burgeoning market in statistical packages.

First off is *FIRST*, which stands for fully interactive regression statistics at £120.

Serious Statistical Software, which wrote the package, claims that it has features to rival those found in mainframe statistical packages. Screen dump and hard copy outputs are available and the package comes with 60 pages of documentation.

Oxstat, has been produced for Beebs running Mallard Basic on a Z80 second processor by Wallingford Computing Services and costs £195 plus VAT.

Further details from: Serious Statistical Software, 'Lynwood', Benty Heath Lane, Hooton, South Wirral L66 6AG. Wallingford Computing Services, 72 Brookmead Drive, Wallingford, Oxon OX10 9BJ.

Foreign business

Tick-Tack is a novel program for those who do business abroad but don't know the language, from Pear Tree Computers.

It contains 200 of the most common business expressions which can be printed out as business letters in any of 20 foreign languages. Price is £160 inc VAT per language.

Contact Pear Tree Computers (0480) 50595.

Typing tips

Word Processing is the title of a new magazine about . . . wordprocessing.

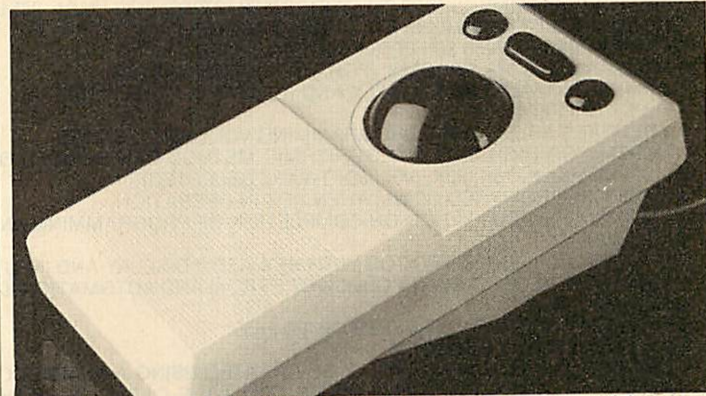
Subscription costs £3.30 for six months or £6 for 12 months. Write to *Word Processing*, PO Box 67, Wolverhampton, West Midlands.

Pointer for Master

By Geoff Nairn

Marconi has produced a pointing device for the Master 128 which will work with the 128's built-in *View* family of business software.

The Trackerball takes over the task of moving the cursor around the screen from the cursor keys. With the *View* wordprocessing software, for example, the Trackerball allows blocks of text to be moved quickly anywhere around the screen.



Marconi's Trackerball: allows blocks of text to be moved quickly around the screen

The add-on was previously available for the Beeb, but required a software patch to work correctly. The 128, however, was developed by Acorn to interface with the Trackerball.

John Ogilvie of Marconi said: 'Acorn were very secretive. We knew six months ago that they were working on a new machine to work with the Trackerball. But we didn't know what that machine would be until the 128 was unveiled to the public.'

Marconi claims that in addition to the *View* family, the Trackerball should work with the majority of software 'correctly' written for the 128. Price is expected to be around £70, which includes a 'pointer' chip holding software to take over from the cursor.

Contact Marconi on (0522) 29992.

Torch makes its machines compatible with Master

Torch has given the Acorn Master its seal of approval by making its range of business computers compatible with the new machine.

Torch broke away from Acorn several years ago to produce a range of stand-alone machines and add-ons based on the BBC micro, including a Z80 second processor, the IBM PC-compatible Graduate, and the Unicorn Unix machine.

At the end of last year, Torch released the Triple X, a more advanced multi-user Unix system, which did not use a BBC micro circuit board.

However, Torch has reaffirmed its commitment to the new range of Acorn machines by developing new firmware to make its whole product range compatible with the Master.

Acornsoft has converted its *Farm Management* package to run on Torchnet or Econet networks and already has orders from seven agricultural colleges.

Still on the network front: British Thornton has produced a network version of its *Compas* computer-aided design software, and Wycombe Software has come up with an integrated business package – wordprocessor, spreadsheet, database and graphics – to run on Econet. Price is £25.

Wycombe Software, 30 Desborough Park Road, High Wycombe, Bucks HP12 3BQ. British Thornton 061-998 1311.



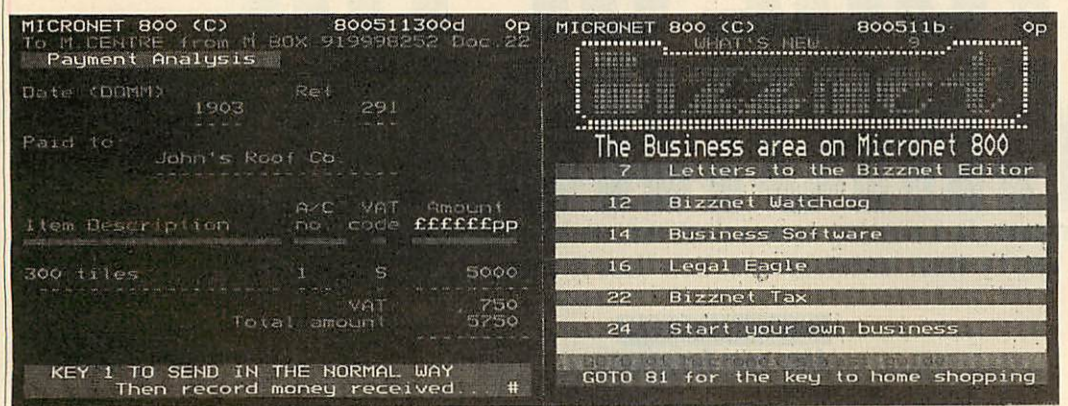
Quick on the keys

The Velotype keyboard can churn out characters at the rate of 200 words per minute.

The keyboard plugs into a *View*-equipped BBC micro – or other machine – and works on the principle that a syllable or word consists of an initial consonant, a vowel and a final consonant. All three are keyed at the same time using the Velotype and a built-in microprocessor puts them in the right order.

Price is £1250 from Veloquick on 01-575 7070.





The on-line accounting service (left) is just part of Micronet's Bizznet area which offers 500 pages of information and services to business users

Accounting outline

Micronet 800 has launched an 'online' accounting service to relieve some of the headaches of running a small business.

The service is available to any Prestel subscriber, who simply has to key in details of payments and receipts onto blank forms onscreen which are then transmitted to an accountancy firm, MAS.

Once a month the subscriber receives through the post a breakdown of the month's transactions, including VAT records, bank statements, purchase and sales ledgers, plus breakdown and analysis of expenditure.

The service, which is found on the Bizznet pages of Micronet, costs £37.50 per quarter, plus an initial registration fee of £75. According to Micronet, this can work out considerably cheaper than employing an accountant.

Bizznet has 2000 business users and some 500 pages of business news, accounting and legal advice, and a business 'problem page'.

Details from Micronet 800, 8 Herbal Hill, London EC1R 5EJ.

Data act confuses businesses

by Geoff Nairn

Thousands of small businesses using computers are unknowingly breaking the law, by not registering under the Data Protection Act.

In early April 15,000 users had applied for registration at the Data Protection Registrar's office but the office believes there are possibly 350,000 users who should be on its list. Nigel Waters, Assistant Registrar, said: 'We believe that we'll get a rush of applications nearer the registration deadline (May 11) which will bring the figure up to 200,000.'

A survey by the Central Office of Information revealed that less than half of small businesses with data processing operations covered by the act accepted that the law applied to them.

A straw poll carried out by *Acorn User* confirmed that many *AU* advertisers were ignorant or confused about the Act. Watford Electronics has the names and addresses of half a million customers stored on computer. Watford MD, Nazir Jessa said: 'I'm 100 per cent sure we don't have to register'.

Rob Pickering of Computer Concepts said: 'We have a mailing list of 12,000 names stored on computer. I understand that we are meant to register but we haven't got round to it yet.'

The Registrar's office suggested that anyone unsure should register anyway. After the May deadline, data users are open to prosecution if they have not registered and are not exempted.

Enquiries to the Registrar's office on (0625) 535777.

Surgery software

Micromedic is a practice management software package for GPs.

The software contains an age/sex register, can list groups of patients with the same conditions, recall patients for immunisations and generate repeat prescriptions.

The package needs 800k disc drives and costs £850 from The Computer Room, 206 Main Street, Newthorpe, Notts.

Lost data found

Lost data and locked up keyboards should be a thing of the past with the Smoothline four-way mains filter socket.

The unit costs £11.80 and its maker, Conblock Electrical, claims it eliminates mains-borne interference 'almost completely'. Tel: (0686) 27000.

Exchequer power

Chancellor arrived too late to use in the budget, but this economic simulation program for the Beeb lets you try to balance the nation's books.

Chancellor costs £29.95, including a book on macroeconomics. McGraw-Hill on (0628) 23432.

Guide to programs

VNU has published the *Software Users' Year Book*, a guide to over 4500 serious software packages available for micros and over 300 titles listed for the Beeb.

It costs £50 plus £2.20 p&p from VNU on 01-439 4242.

BUSINESS TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	Mini Office 2	Database	£14.95	No	No	Yes	*	*	—
2	Fleet Street Editor	Mirrorsoft	—	£39.95 (2 discs)	—	—	Yes	—	—
3	Wordwise Plus	Computer Concepts	—	—	£56.35	—	—	Yes	—
4	Vucalc	Psion	£14.95	*	No	No	*	No	*
5	Database	Gemini	—	£29.95	—	Yes	*	*	*

Compiled by Gallup/MicroScope. Contact publisher: Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Tel: (061-456 8383). Psion Software, Harcourt Street, London W1H 1DT. Tel: 01-723 9408. Gemini, Gemini House, Concorde Road, Exmouth EX8 4RS. Tel: (0395) 265165. Mirrorsoft, 74 Worship Street, London EC2A 2EN. Tel: 01-377 4837. Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63933.

FUTURE OF THE COMMUNICATOR

The Communicator is a desktop communications, workstation designed by Acorn to be developed for business use by other manufacturers. How does it square up to its competitors in the market?

Alex van Someren

In case you hadn't heard, Acorn has designed and sampled a desktop communications workstation which it isn't going to sell to the likes of you and me. More fool them, since it takes Acorn's eight-bit 6502-based architecture to the logical 16-bit conclusion many Acorn supporters have been waiting for. At the same time it provides scope for exciting communications applications, and some of the possible peripherals are a dream come true.

The Acorn C-Series Communicator is designed as a building-block to which Value Added Retailers (VARs) could add their own peripherals, software and label. So far none of the major companies which have been shown the machine has taken up Acorn's offer (minimum order 500), and Acorn says that it has currently no plans to market the machine.

This review discusses the hardware and software design which makes the Communicator a serious rival to the QLs and One Per Desks of the business marketplace.

The Communicator is housed in a cool blue-grey low-profile box surmounted by a slightly cramped 90-key keyboard. It has a bracket at the left-hand end to support an optional push-button telephone, and a large Electron-style expansion connector (complete with nasty plastic protective cover) on the right-hand end. The back has all the standard sockets such as RGB monitor, Econet, parallel printer and LCD display (!) – provision is made for an arbitrarily large liquid crystal screen, though Acorn did not show me one working. A monochrome monitor can be hooked up via the display socket.

The keyboard has a main qwerty typing area with a slightly different layout from that of the BBC micro's.

Separate numeric and cursor-key pads make life a little easier, but many of these keys have several legends printed on them which I found rather confusing. A number of special keys are also present, of particular importance the Help and Stop keys, discussed in detail below. The expansion connector has two secure bolt-holes for fixing add-ons, about which Acorn has little to say except 'anything is possible'. Prototype peripherals considered by Acorn have included twin dictation cassette drives (for voice and data storage), a Euro-standard teletext decoder, a cable TV interface and a Euro-standard teletext decoder, a cable TV interface and a fully digital CODEC interface for speech storage and, possibly, recognition. The dictation cassette drives would allow the machine to act as a telephone answering machine for both human and electronic callers as well as providing the obvious office function of taking letters.

Integral modem

One of the Communicator's central features is its self-contained auto-dial/auto-answer multi-speed modem. This offers all the usual combinations of 75, 300 and 12000 bits per second (bps) data transfer, as well as having both pulse and modulated frequency tone dialling (the latter commonly used by office telephone exchanges). Having the modem built-in means that the RS423 socket is free for printers and other serial devices, and also allows Acorn to bring the telephone lines out on an expansion port for use by future peripherals.

Either 128k or 512k bytes of dynamic memory can be fitted inside the case 64k or 256k RAM chips. The screen memory is provided by a quite separate block of 32k of dynamic memory connected directly to the screen controller. Additionally, up to 32k bytes of battery-backed CMOS RAM may also be present. Up to a megabyte (!) of firmware can be installed in the four 128k byte ROM sockets, ensuring that applications' developers will not lack space.

The display is provided by Acorn's trusty semi-custom chip, 'Aberdeen', also known as the Electron ULA. This single chip contains all the circuitry needed to generate BBC micro-compatible screen modes 0-6, though at the expense of some processor speed when display memory is accessed in modes 0-3. A software simulator exists to provide a monochrome version of mode 7 and this is used by the Prestel software discussed below.

The Communicator's Central Processing Unit (CPU) is the 65816, a 16-bit device designed as a fully compatible upgrade for the 6502, running at 2MHz. It has two modes of operation: an extended (16-bit) mode and a 6502 emulation mode. The latter allows it to run 6502 software without modification, though the Communicator does not make use of this feature. The processor has a 16-bit internal architecture, but in order to make it fit into a standard 40-pin package some of the address pins are multiplexed onto the data bus (rather like the Intel 8088). There are 24 address lines, providing 16 megabytes of address space which is divided into 256 'banks' of 64k bytes. An eight-bit Data Bank Register controls which bank is being accessed, but 'Long' instructions exist to access memory in the rest of the address space.

Internal registers include a 16-bit Program Counter (with an associated eight-bit Program Bank Register), a 16-bit Accumulator and two 16-bit index registers. The stack pointer is also 16 bits long, though the stack must always reside in bank zero. A 16-bit Direct Register allows any 256-byte section of bank zero to be treated as 'zero page', with consequently faster instructions, and so on.

There are 24 addressing modes, including the 6502's original 13, and a lot of new instructions including block moves, bit manipulation, and individual pushes and pulls for all the registers. The IRQ and BRK vectors have been separated, and there is a new 'software-interrupt' instruction COP (for CO-Processor), which is used by Acorn to rationalise the operating system interface.

PHOTOGRAPH BY DAVE KING



Overall, this is the processor that most 6502 fans would like to have seen last year, but when it becomes available in faster versions shortly it will be an absolute knockout.

Acorn has employed Paul Bond, author of the original BBC micro MOS, to help write the Communicator's operating system. At the time of writing the OS provided primitive task switching to enable you to swap quickly between applications. This means you can leave an application by pressing the Stop key, start another task running with a few key presses and then return to your original application with everything 'untouched'. Acorn has hinted that a more sophisticated multi-tasking user-interface, possibly with windows, will be forthcoming.

The operating system in the Communicator makes use of the new COP instruction to provide a uniform way of making OS calls: the COP command is followed by a code indicating the function required, and then parameters are supplied as necessary. The operating system uses this technique for all calls, including input/output, task switching and memory management. The OS has been extended to include the Acorn 40-bit Floating Point Arithmetic package, allowing any application access without the author needing to write his or her own package. Also new are memory management COP calls, which serve to allocate various sizes and kinds of memory to different tasks (particularly Direct Page memory, which is scarce).

The Communicator has its own version of Basic, curiously named Version 4.0 (curious because the Master also purports to run Version 4). It contains most of the extensions that the Master's Basic has, but its assembler and machine-code interfaces are quite different. Unsurprisingly, the assembler supports the full 65816 instruction set, and has a number of new pseudo-variables to represent registers and operating system vectors and calls.

Help key

Basic has one extension which stands out: it allows for a procedure called '@HELP' which is executed when the Help key on the keyboard is pressed. You may have noticed that until now no mention has been made of file storage facilities: that's because the Communicator doesn't have any! However, it does have an Econet interface, and this is the technique that the user is expected to use. Acorn has designed a self-contained Econet file-server/printer-server in the same style as the Communicator itself. It offers either 1.2 Megabytes of storage on two 3.5in floppies or 20 Megabytes on a hard disc and one 600k floppy. This device contains a 6512 processor, 64k of ROM, 64k of RAM, a disc controller and a Centronics parallel printer interface. It also contains a real-time clock of its own which is used to time-stamp files. To use it you simply plug a Communicator into it with a 5-pin DIN audio lead and go! For Econet buffs, it has an intelligent network clock generator which connects itself if no other clock is detected on the network. The file server is controlled by ANFS software in each Communicator, and offers a full hierarchical file structure much the same as the ADFS.

This approach to file storage reflects Acorn's feeling that the Communicator will be used in small offices where most file traffic is local to a few machines. An Econet Bridge costing £200 can be used to connect a small local Econet such as this to a larger backbone network and thus to the rest of the building. In this way huge networks can be built up without degrading performance: more expensive networks such as Ethernet cannot offer this kind of flexibility as cheaply.

It is a pity that more commercial users do not take advantage of the Econet; at present Redwood Publishing and Acorn are its only major business users.

The Communicator was supplied with some demonstration software in EPROM which was written in Basic. Intended to give an idea of the form typical applications would take, it included a Prestel terminal, glass teletype, address book and a full-screen memory calculator. Since this software was in prototype form and will not be avilable to end users it does not seem relevant to examine it further.

Conclusion

It seems to me a great pity that Acorn feels it should keep what must surely be one of its best-designed machines out of the hands of the public. Of course there is more to selling a machine than just pushing cardboard boxes out of the door, but they have already spent a medium-sized fortune developing the machine and I hope some VASR will give them credit by buying it up. Knowing Acorn though, it'll probably throw the computer away and use the case for something else!

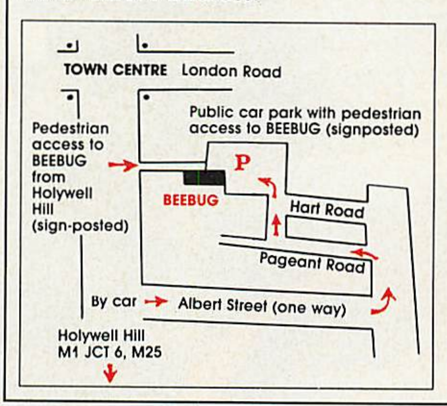
BEEBUG RETAIL

BEEBUG SHOWROOM AND MAIL ORDER

The products in this price list are available in our showroom in St. Albans and by mail order. Telephone your order on 0727 40303 or send the order form to the address below. Alternatively come along and see us. We are open 9 - 5.30 Mon - Sat, and there is ample parking at the rear of our premises.

We take both Access and Visa credit cards. Simply telephone us on our multi-line telephone number 0727 40303 quoting: Cardholder's Name, Cardholders Address, Cardholder's Telephone number, Credit Card number, expiry date, order details.

PLEASE NOTE: that the mail order despatch address must be the same as the cardholder's address.



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- Computers
- Printers
- Monitors
- Disc Drives
- Budget Discs
- Software

This Months CODEBREAKER Number is V11698

COMPUTERS

BBC Master Series
The Master 128 is proving to be extremely popular with the bundled software making it excellent value at £499. The new Turbo 6502 Co-processor is now available and priced at only £125 offers an unsurpassed increase in processing speed. The IEEE Interface is a new addition to our range; this allows the micro to be connected to scientific intrumentation.

Disc Starter Pack
We are pleased to announce a special Disc Starter Pack for users who are still cassette-based. Consisting of an Acorn 1770 disc interface, Cumana CSX100 drive, Disc Drive Guide, and 10 Beebug discs all for only £170, this will finally dispense with laborious loading from cassette!

Code	Description	Price inc. VAT
0200	Master 128	489.00
0230	65C102 Co-Processor 6502 "Turbo"	125.00
0234	M128 Econet Module	48.00
0235	M128 Eprom Cartridge	14.00
0240	M128 Reference Manual 1	14.95
0241	M128 Reference Manual 2	14.95
0242	M128 Advanced Ref Manual	19.95
0203	'6502' 2nd Processor	189.00
0204	'Z80' 2nd Processor	368.00
0205	Acorn Prestel Adaptor	129.00
0206	Acorn Teletext Adaptor	139.00
0237	Acorn IEEE Interface	320.00
0217	1770 Disc Interface Kit	49.00
0218	ADFS Upgrade for 1770 DFS	29.00
0208	1.2 Operating System	6.90
0209	1.2 DNFS Rom	19.50
0210	A to B Upgrade Kit	69.00
0212	Acorn Speech Upgrade	46.00
0222	Disc Starter Pack	170.00

PRINTERS

The Brother Daisywheel is reduced by £50 to only £325. The Epson LX80 dot-matrix printer is reduced by £40 and now contends with the Taxan KP810 as best-selling printer. Joining our list of popular ribbons at £5 or less is the Epson FX/RX80 ribbon. If you use both a true daisywheel and a matrix printer, the new TCS26 printer sharer will allow you to connect two printers to one micro and switch between the two.

Code	Description	Price inc. VAT
0300	Brother HR 15 Daisywheel	325.00
0302	Canon PW1156A 15"	405.00
0303	Canon PJ1080A colour	460.00
0304	Epson LX 80	230.00
0313	LX80 Tractor Feed Unit	23.00
0315	LX80 Cut Sheet Feeder	55.00
0305	Epson RX 100 Printer	392.00
0306	Epson FX 80 (while stocks last)	273.00
0307	Epson FX 100 Printer	490.00
0308	Epson JX 80 Colour Printer	520.00
0318	Epson HI 80 Plotter	379.99
0319	Epson FX85 NLQ Printer	438.00
0309	IBICO LTR1 Letter Quality	132.00
0310	Juki 6100 Daisywheel Printer	359.00
0311	Taxan KP810 NLQ Matrix Printer	265.00
0312	Linear Graphics Plotmate Plotter	333.50
0316	Taxan KP910 15" NLQ Matrix Printer	390.00
0400	Printer Roller Cleaner Kit	6.00
0401	2M Printer Lead	8.00
0402	Ribbon for Epson FX80/RX80/MX80	3.00
0403	Ribbon for Epson FX100/RX100	4.00
0408	Ribbon for Canon PW/Taxan KP	5.00
0413	Ribbon for Epson LX 80	4.50
0415	Ribbon for Epson JX80	14.95
0418	Ribbon for Juki 6100 (Single Strike)	1.55
0414	Ibico Ink Roller	4.60
0406	Paper 2000 sheets 11x9.5" 70gsm	14.50
0452	Paper 2000 sheets Real A4 80gsm	28.75
0453	Paper 1000 sheets 2-part carbonless	23.00
0407	3.5""1 7/16" Labels 1000	4.00
0416	Dust Cover KP810/PW1080A	5.45
0404	Daisywheel for Juki 6100	20.50
0405	Daisywheel for HR-15	20.50
0419	Fontaid ROM & Disk 40T	30.00
0420	Fontaid ROM & Manual 80T	30.00
0421	Fontaid Extra Disc "A" 40T	15.00
0422	Fontaid Extra Disc "A" 80T	15.00
0429	Watford NLQ Rom (Epson)	28.75
0432	TCS26 Printer Sharer	22.49

MONITORS

Most of our monitors are reduced this month. The Taxan 1202/3 monochrome monitors are better value than ever, and the new amber Zenith 123 model looks likely to establish itself as the best budget buy. The Microvitec 1451 is our most popular RGB monitor and is this month reduced to only £260.

Code	Description	Price inc. VAT
0500	Taxan KX1201 12" Green Short Perst.	103.00
0501	Taxan KX1202 12" Green Long Perst.	116.00
0502	Taxan KX1203 12" Amber Long Perst.	116.00
0503	Zenith 123 12" Green	82.80
0504	Zenith 122 12" Amber	87.40
0556	Monitor Lead BNC for Taxan/Zenith	3.90
0530	Microvitec 1431 Med-res Monitor	206.00
0531	Microvitec 1451 Hi-res Monitor	260.00
0532	Philips CT2007 14" TV/Monitor	225.00
0534	Philips CT1114 14" TV/Monitor	200.00
0550	Monitor Lead RGB for M'vitec/Philips	5.75
0535	Supervision III RGB Monitor	379.99
0555	Supervision Monitor Lead	7.00

OTHER HARDWARE

The Watford RAM card and AMX Mouse will remain at special prices for this month. The invaluable eprom extractor tool is reduced. The Le Modem makes an appearance at £103 and the Pace Combo Pack will remain at £135 for this month only.

Code	Description	Price inc. VAT
0701	Aries B32 RAM Card	86.00
0702	Watford 32K RAM Card	65.00
0703	AMX Mouse	69.00
0704	ATPL ROM Board for Model B	39.00
0735	ATPL Battery Backup kit	17.00
0740	Aries B12 Rom Board	45.00
0749	Aries B12C Adaptor	6.90
0736	Watford Mk12 Rom Board	36.80
0737	Watford Battery Backup	3.45
0755	Write Protect for Mk12	2.30
0705	2764 8K eprom	3.45
0706	27128 16K eprom	4.60
0707	6264 8K ram	4.50
0708	Eprom Extractor Tool	3.45
0709	Watford Eprom Eraser	32.20
0747	U.V. Tube for Eprom eraser	10.35
0710	Softlife Eprom Blower	75.90
0714	BBkey Function Key Labels	2.00
0718	Voltmace Delta 3B Single Joystick	10.00
0719	Voltmace Delta 3B Twin Joystick	17.00
0720	Voltmace Delta 14B Joystick.	12.50
0721	Voltmace Delta 14B/1 Interface.	12.50
0741	Voltmace ASC/B	8.50
0742	Delta Driver Disc 40T	9.00
0743	Delta Driver Disc 80T	9.00
0744	Delta Driver Cassette	5.00
0722	13 amp 4-way plug block Extension	10.35
0723	Pocket Screwdriver	0.26
0724	Antex CN17 Soldering Iron	6.79
0725	13 amp plugs	0.86
0726	8 way DIP switch	0.98
0727	RS423 domino plug	0.46
0728	RGB 6 pin DIN plug	0.46
0729	Cassette 7 pin DIN plug	0.30
0730	3-core 6 amp Mains Cable per m	0.36
0731	4-core RS423 Cable per m	0.60
0732	6-core RGB or Cassette Cable per m	0.50
0745	Case & Keyboard Cleaning Kit	4.65
0750	Watford Solid State 16K RAM	32.20
0751	Watford 16K RAM Module	33.35
0752	Watford Diagnostics Disc	23.00
0760	Le Modem	103.00
0761	Nightingale/Commstar Combo Pack	135.00

DISC DRIVES

The Cumana range of drives continue to be the recommended models due to their unsurpassed reliability in our offices. For those of you wishing to add a second drive, the CS100E/400E models have their own power supply unit but no additional documentation, and can be configured to be drive 1 (and 3) if necessary. (S-single drive, D-dual drive, X-excluding power supply unit)

Code	Description	Price inc. VAT
0600	Cumana CSX100 100K 40T	110.00
0610	Cumana CS100 100K 40T	140.00
0601	Cumana CDX200 200K 40T	218.00
0602	Cumana CSX400 400K 40/80T	150.00
0603	Cumana CS400S 400K 40/80T	170.00
0604	Cumana CD800S 800K 40/80T	330.00
0614	Cumana CS100E 100K 40T	130.00
0615	Cumana CS400E 400K 40/80T	165.00
0650	Memorex Discs S/S D/D 48TPI 3481	15.50
0651	Memorex Discs D/S D/D 96TPI 3501	25.50
0652	Memorex Disc Head Cleaning Kit	9.65
0653	Library Case - 10 discs	2.25
0654	Disc Storage Box - up to 50 discs	9.00
0655	Lockable Disc Box holds 35	13.80
0656	Lockable Disc Box holds 85	17.25
	Dynamic Discs	
	Price includes postage and free storage box	
0657	Beebugsoft 10x 48TPI SS DD Discs	13.90
0658	Beebugsoft 10x 48TPI DS DD Discs	18.90
0659	Beebugsoft 10x 96TPI SS DD Discs	18.90
0660	Beebugsoft 10x 96TPI DS DD Discs	19.90
0661	Beebugsoft 25x 48TPI SS DD Discs	33.50
0662	Beebugsoft 25x 48TPI DS DD Discs	43.90
0663	Beebugsoft 25x 96TPI SS DD Discs	43.90
0664	Beebugsoft 25x 96TPI DS DD Discs	46.20
0665	Beebugsoft 50x 48TPI SS DD Discs	53.90
0666	Beebugsoft 50x 48TPI DS DD Discs	77.90
0667	Beebugsoft 50x 96TPI SS DD Discs	77.90
0668	Beebugsoft 50x 96TPI DS DD Discs	84.90

SOFTWARE

Most of the Acornsoft range is reduced further. New titles include Micros in Business priced at £65 which is an excellent demonstration of how to use micros in a small business environment. The AMX range of mouse software also has further titles. Fleet Street Editor priced at £34 allows you to create your own newspaper and will be of great use to schools. The best selling Mini Office II is also new at under £17.

Code	Description	Price inc. VAT
1000	Acornsoft View	45.00
1001	Acornsoft View Sheet	45.00
1002	Acornsoft Hi-View	45.00
1019	Acornsoft Viewstore ROM	45.00
1021	Acornsoft Viewindex Disc	11.00
1022	View 3.0 Rom	69.00
1030	Acornsoft ViewPlot	22.00
1003	Acornsoft Lisp Rom	48.00
1004	Acornsoft BCPL	51.00
1026	BCPL Standalone Generator	48.00
1007	Acornsoft ISO Pascal	65.00
1028	Pascal Standalone Generator	32.00
1008	Acornsoft Basic Editor	28.00
1013	View Printer Driver Cassette	8.00
1014	View Printer Driver Generator Disk	9.00
1015	Acornsoft Revs Disc	17.00
1024	Acornsoft Revs Cassette	14.00
1029	Revs 4 Tracks Disc	11.95
1032	Revs 4 Tracks Tape	9.00
1016	Acornsoft Aviator Disc	17.00
1017	Acornsoft GXR B	28.00
1018	Acornsoft GXR B+	28.00
1027	Micro PROLOG	74.00
1031	Acornsoft Termulator Rom	30.00
1033	Microtext Rom	53.00
1034	Microtext Plus	240.00
1035	6502 Development Pack	45.00
1039	Creative Sound Disc	19.00
1040	Micros in Business Disc	65.00
1100	Wordwise Plus	46.00
1102	Wordwise	28.00
1103	C.C. Graphics ROM	25.00
1104	Printmaster (Epson)	28.00
1105	Printmaster (Star)	28.00
1106	Accelerator	56.00
1107	Speech ROM	28.00
1108	Acorn Speech Processor	10.00
1109	Disc Doctor	28.00
1110	Intersheet	47.70
1114	Interchart	29.90
1123	"SPEECH!" Disc 40/80T	11.95
1150	AMX Desk Disc	19.00
1151	AMX 3D Zicon Disc	19.00
1152	AMX Database Disc	19.00
1153	AMX XAM	19.00
1154	AMX Pagemaker Plus	40.00
1155	AMX Superart Rom	40.00
1156	AMX Paint Pot Disc	11.00
1160	AMX Utilities	11.00
1170	Fleet Street Editor 40T	34.00
1171	Fleet Street Editor 80T	34.00
1172	Mini Office II Cassette	14.50
1173	Mini Office II 40T	16.50
1174	Mini Office II 80T	16.50

ORDER FORM

CARRIAGE. Please **add £1.00** carriage to all orders except Computers, Monitors, and Printers **add £7.00** per item. Disc Drives, 2nd Processors, Modems etc. **add £5.00** per item. Listing Paper **add £2.00** per box.

BEEBUG MAIL ORDER
Dolphin Place, Holywell Hill, St.Albans, Herts. AL1 1EX (Dolphin Place is opposite 18 Holywell Hill in the centre of St.Albans).

CODE	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL

NAME: SUB TOTAL £

ADDRESS: CARRIAGE £

POSTCODE: TOTAL £

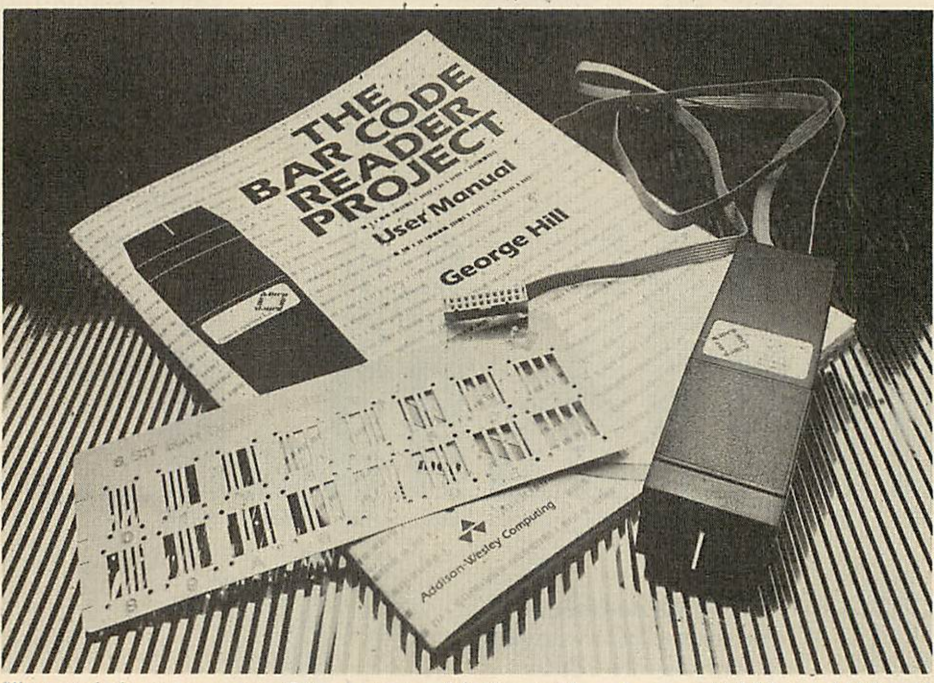
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In accordance with our competitive pricing structure prices are subject to alteration at any time.

BAR CODE

ACORN USER OFFER

Bar code readers and program booklets



Illustrated above are some of the contents of the Bar Code Teaching Pack, designed to give the student or home user the chance to learn about and use bar code technology.

The pack was developed by the Microelectronics Education Programme (MEP) and Addison-Wesley and is available direct to readers of *Acorn User*.

The pack includes:

- the bar code reader – which connects directly to your microcomputer
- a user manual written by George Hill
- software to print bar codes and a metal bar code stencil
- a 40-track disc or cassette of utility software – the cassette software can be transferred to 40 or 80 track disc.

The total pack costs £83.84 inc VAT and £2.95 postage (£72.90 exc VAT), and the Department of Trade and Industry (DTI) has accepted the teaching pack is eligible for support in its entirety.

Bar code booklets

All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Send a cheque or postal order for £1.90 plus an A4-sized sae to the address below.

Back issues of the booklets are available from December 1984 onwards, so you can catch up on any you missed.

Please state which month you require when ordering bar code booklets.

Please send me: ________ Bar Code Reader Teaching Packs* at £83.84 each inclusive

☐ 40 track disc ☐ or cassette (*Please tick appropriate box)

I enclose cheque/postal order for £ ________ made payable to Redwood Publishing

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ADDRESS

POSTCODE

SIGNED DATE 160-6

Send this form with your remittance to:

Bar Code Offer, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF HAS

EDUCATION

NEWS

Old favourites reissued

ESM, the Wisbech-based software house, has recently launched a range of new titles including the *Pazazz* package from ASK.

ESM has taken over the marketing of the ASK range since the active part of that company was wound up. All titles are now available through ESM and are in the same format as before.

This enterprising software publisher has also picked up part of the Shiva range which closed last year after financial difficulties. The complete *Primary Maths Programme* including *Numeracy* and *Logic* are again available.

These excellent programs from two highly reputable educational publishers now complement the range already produced by ESM. Their links with MEP have meant that much of their material has been developed with government subsidy under the Microelectronics Education Programme and has therefore been overseen by highly skilled educationalists and programmers.



Wordboard: fascinating theme pack

Supastore – an easy to handle ROM-based database management system – has been developed by Jim Milne and programmed by David Tee and Andrew Jacobs. Searching for records is probably simpler than on any other package available. Searches and most other operations are defined by movement of highlighting on screen to select the option required. The system has been well-tried and a recommendation is that ESM relies entirely on *Supastore* for all its records. The package allows 255 characters per field, 250 fields in a record (yes, 250!), 3000 characters per record and up to 3500 records per database. *Supastore* costs £33.95.

Other programs recently released cover the primary creative writing and vocabulary areas very thoroughly indeed.

Wulfstan's Wordboard is a fascinating vocabulary-based theme pack in which groups of two or three children meet Wulfstan through the crystal cube and undertake three tasks to become fully apprenticed wordsmiths. Wulfstan is a rather superior Anglo-Saxon word-hoarder who institutes discussion about the meaning of words, how children should go about creating definitions and finding ways of making adequate descriptions of things, people and places.

The pack comes complete with disc, handbook, storybook, poster and eight photocopy masters and costs £17.50.

Another two programs from a similar area are *Wordweb* and *Microstory*. *Wordweb* is a thesaurus with teletext pictures relating to four scenes – the farm, the zoo, the street and the home. Children can investigate words and their relationships in a fascinating and creative way. *Microstory* provides the teacher with a means for planning stories written by the children in pre-determined ways.

Wordweb costs £29.95 (5 discs!) and *Microstory*, £11. Contact ESM, Duke Street, Wisbech PE13 2AE. Tel: (0945) 63441.

Wide range of Wordpower

Further to the item on wordprocessors last month, Ian Copestake (who you may remember for his *Wordsworth* wordprocessor) has produced a new package called *Wordpower*.

This powerful and well-presented pack has been created from scratch and, to quote Ian, 'I drew on the response from users and reviewers of the earlier *Wordsworth* program and took all their suggestions into account.' The end result is a package which will suit a wide range of abilities and tastes. Moreover, it will also suit a wide range of machines because it has been programmed 'legally' and will therefore upgrade without problem on the B+, Master and ADFS. It features customisation which causes it to boot up in whatever configuration the user wants and it will operate on the Electron and on networks. All the usual features of a wordprocessor are present including printer drivers.

The whole package costs £35 with a licence fee of £2 per station and £13 per additional ROM in bulk purchasing.

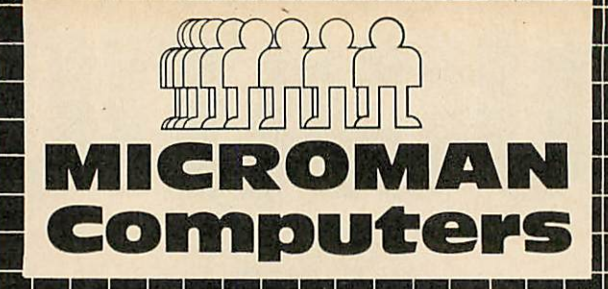
Contact Ian Copestake, 23 Connaught Crescent, Brookwood, Woking, Surrey GU24 0AN. Tel: 04867 4755.

EDUCATION TOP FIVE

	Title	Publisher	Cassette	Disc	ROM	Electron	Shadow on B+	6502	Econet
1	Best 4 Language	ASK	£19.95	£19.95	—	Yes	Yes	—	—
2	Best 4 Maths	ASK	£19.95	£19.95	—	Yes	Yes	—	—
3	Physics	Longman	£17.50-	—	—	Yes	—	—	*
			£22.50	—	—	Yes	—	—	*
4	German Master	Kosmos	£8.95	£9.95	—	£8.95	Yes	—	—
5	Number Painter	ASK	£9.95	£11.50	—	Yes	Yes	—	—

Compiled by Gallup/MicroScope. *Contact publishers: Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds. Tel: (05255) 3942. Longman, Burnt Mill, Harlow CM20 2JE. Tel: (0279) 26721. ASK, 32 Bridge Street, Cambridge CB2 1UJ. Tel: (0223) 65445.

Commentary by Nick Evans





ACORN SPECIALIST COMPUTER CENTRE



All our prices include VAT.

THE NEW BBC MASTER SERIES

Master 128	
Master Turbo Upgrade	125.00
Master ET	399.00
Master 512 Upgrade	T.B.A.
Master SC Upgrade	T.B.A.

ACORN PERIPHERALS & UPGRADES

Teletext Receiver	149.00
Prestel Receiver	139.00
6502 2nd Processor	199.00
Z80 2nd Procesor	399.00
IEEE Interface	325.00
Acorn 10MB Hard Disc + Level 3	1699.00
Acorn 30MB Hard Disc + Level 3	2499.00
BBC B Plus Upgrade 64-128K	39.95
ADFS Upgrade	30.00
1770 Upgrade	49.95
Acorn DNFS Disc Upgrade	99.00

RAM/ROM EXPANSION BOARDS

ATPL Sidewise ROM Board	43.70
Computer Village ROM Board	49.00

SOLIDISK PRODUCTS

Solidisk 32K Sideways RAM	53.00
Solidisk 64K Sideways RAM	80.00
Solidisk 128K Sideways RAM	125.00
Solidisk DDFS 2.2 Interface	45.00
Solidisk ADFS 2.1 Interface	55.00

EPROM PROGRAMMERS-ERASERS-I/CS

Control Telemetry Eprom Prog.	109.25
Eprom Programmer	20.95
Eprom Programmer + ZIF Socket	25.95
Eprom Eraser	20.95
Eprom Eraser with Timer	25.95
Eproms 2764 8K Hitachi	2.75
Eproms 27128 16K Hitachi	2.95
27128 per 5 Eproms	12.50
RAM 6264LP-15 8K	3.95
27256 (12·5v)	5.95

MONITORS (including cable):

Microvitec 1431 Standard	229.00
Microvitec 1451 Medium	279.00
Philips 1114 TV/Monitor/CV	219.00
Philips CMB8533 Med/RGB/CV	299.00
Philips Green 7502	90.00
Philips Amber 7522	94.00

MODEMS/COMMUNICATIONS

Pace Nightingale + Commstar	132.25
Prism 2000 + Linemaster ROM	49.95
Pace AutoDial/AutoAnswer Board	56.35
Pace Auto Dial Utilities Disc	11.50

Bulletin Board service for full details of Microman Computers latest prices, special offers, contact:
MORECAMBE BULLETIN BOARD 1200/75 (Commstar users: Filter off) TELEPHONE 0524 426133

DISC DRIVES

Pace PSD1 SS/40T/100K	109.25
Pace PSDIB (above in dual case)	126.50
Pace PSD3 DS/40T-80T/400K	143.75
Pace PSD3B (above in dual case)	161.00
Pace PDD3 DS/40T-80T/800K	276.00
Cumana CSX100 SS/40T/100K	114.95
Cumana CSX400 DS/40T-80T/400K	154.95
Cumana CDX800 DS/40T-80T/800K	299.95
Pace PSD1P SS/40T/100K	143.75
Pace PSD3P DS/40T-80T/400K	169.05
Pace PSD3PB (above in dual case)	186.30
Pace PDD3P DS/40T-80T/800K	312.29
Cumana CS100 SS/40T/100K	147.95
Cumana CS400 DS/40T-80T/400K	179.95
Cumana CD800S DS/40T-80T/800K	339.95
Pace Power Supply	44.85
Opus Challenger 512K	249.95
WABASH 5.25" DS/DD/80T (10)	16.50

AMX MOUSE

AMX Mouse inc SUPER ART	89.95
AMX Desk	24.95
AMX Utilities	14.95
AMX Paintpot	14.95
AMX Super Art ROM	49.95
AMX Pagemaker	49.95
AMX 3D Zicon	24.95
AMX Database	24.95
AMX Xam	24.95

PRINTERS

Canon PW1080A + BBC Cable	289.00
Taxan Kaga KP810 + BBC Cable	P.O.A.
Canon PW-1156A	459.00
Canon PJ1080A Colour	573.85
Quandata Daiseywheel	199.00
Juki 6100 Daiseywheel	379.00
Epson LX80 NLQ	258.75

JOYSTICKS

Voltmace 14b Handset	14.95
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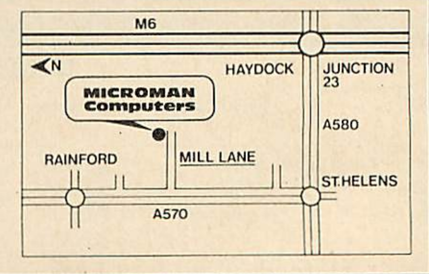
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Phone bills hit modems

The rush to jump on the Department of Trade and Industry's bandwagon of a free modem for every secondary and middle school is likely to spark a revolution in more ways than one.

Schools which have taken up the offer are already finding that telephone bills are creeping up: who pays is a matter for the individual local authorities, some of whom look kindly on the matter and integrate the money into the overall school phone bill. Others insist that a separate bill is presented to the computer studies department (why they should receive it is a mystery since the most useful place for a modem is in the school library).

Others are known to have refused responsibility for the bills incurred and refuse to fit telephone lines for modems.

Ray of hope

This varied reaction is predictable and seasoned observers will be able to name each local authority in each category without much difficulty. One small ray of hope emerged in March: the offer by Prestel Education to provide six months' unlimited access to its services for only £40 including membership of the service. This scheme runs from March 28 to September 27 so there's time for your school to take advantage of it (quite why Prestel thinks that schools are going to want the facility throughout the summer holiday is another mystery). Perhaps gentle pleading from schools and children to Prestel Education may encourage them to extend their offer so that schools who have received their modems late might fully benefit.

All in all, though, there are three hearty cheers needed for the DTI and for Prestel Education.

True disaster blockbuster

Search and Rescue from Storm software is another blockbuster simulation from the company that brought us *Flight Path*. If you were impressed by that one, you'll find *Search and Rescue* will be just your cup of tea!

The package simulates a disaster at sea with the user in charge of the emergency services – namely, the lifeboat stations and the helicopter bases. You might think that a sinking ship could easily be traced and that all that is necessary is to press the bell in the lifeboat station and away goes the lifeboat. Nothing could be further from the truth. The scene is set in the coastal area between Swanage and



Search and Rescue: trouble at sea

the Needles. The children have to select the most appropriate form of rescue craft both for the conditions and for the capacity to carry survivors. Fuel consumption, route plotting, compensation for drift caused by tide and wind all have to be dealt with. The scenery for all this is provided by some excellent colour graphics. The style is highly reminiscent of *Flight Path* and the difficulty level is probably a shade higher.

As part of a topic or integrated into a study on geography, co-ordinates or the sea, this package offers excellent value for money. The teacher should be warned, however, that it's best used as part of a carefully controlled project and not in isolation. To that end an incredibly complex chart of associated work is provided with the teacher's notes.

The package comes complete with disc, instruction book, charts and plans and costs £17.65.

Graphic details from Glentop

Supergraph from Glentop Publishers provides you with one of the most powerful graph-drawing packages around. It has the facility, as well as creating standard two-dimensional graphs, to extend to three-dimensions.

It operates on standard mathematical notation and doesn't need any programming skill – although you do have to know your maths! With this package graphs with common elements may be superimposed on each other and Cartesian, Polar, Parametric and Polar-parametric co-ordinate systems may be used. The package has been designed to provide the maximum number of facilities with the minimum of fuss.

Glentop are a company which has kept a low profile and yet they have recently produced some excellent packages for education. *Honeylogo* has been adopted by several local education authorities and is being constantly developed and improved upon – it's a good intermediate package between the expensive chip-based ones and the stripped-down turtle graphics packages.

The company also produces an excellent three-dimensional graphics development system which allows you to create, shrink and expand, rotate and twist 3D line drawings.

It's a complex package but surprisingly easy to drive once you get the knack and should prove a valuable addition in any school CDT department.

Contact Glentop Educational Books, Standfast House, Bath Place, High Street, Barnet, London EN5 1ED. Tel: 01-441 4130.

First-class geography

BBC Soft has done it again – another first-class package combining excellent presentation with imaginative ideas.

The *Introducing Geography* package consists of two discs containing four programs. They cover contour lines by putting you in a situation where your plane has crashed. The only way out is to follow the river to the sea and hail a passing boat – but how do you find the river? Those who know the meaning of contour lines soon solve the problem. In *Summit*, you are leading a team of climbers up Mount Everest. The logistics of handling supplies and equipment are the basis of this testing simulation and the excellent graphics give you a fine feel for the situation you find yourself in.

Nomad is a simulation based on the nomadic tribesmen of Africa: you must keep your cattle alive and watch the signs around you.

In *Flight* you must navigate a plane when its automatic pilot fails. Flight plans must be prepared and an adequate knowledge of navigation and flying skills are needed to complete this task. Contact BBC Soft, 35 Marylebone High Street, London W1M 4AA.

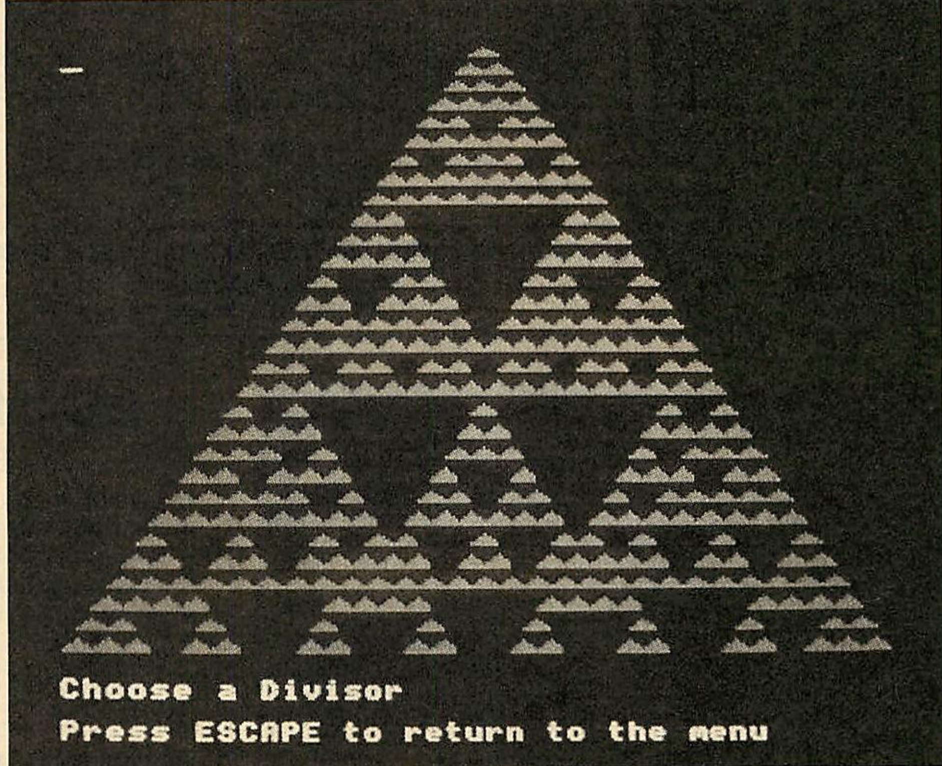
EDUCATION

THE PROGRAMS THAT COUNT

Although the use of computers in schools originated in the mathematics department, that is the area of the curriculum most poorly served by software, so here are some pointers towards worthwhile packages

Chris Drage and Nick Evans

If you trace the ancestry of the use of computers you inevitably arrive back in the classroom of the mathematics teacher who was lumbered with computer studies when first it came into vogue. These brave souls had to perform a juggling act to keep both mathematics and computer studies curricula going and were often called on to look after other staff who felt the urge to 'get into computers.' Although the concept of educational computing grew largely out of the maths classroom, it is probably the area with the least adequate provision in terms of software and computer applications. The major tools, apart from spreadsheets, by and large deal with textual or graphical information and, although databases may be used to handle numeric information for statistical purposes, this is often a starkly uninteresting course to follow unless it is couched in a fascinating context.



Symmetry: **'an entertaining program containing tutorial and activities related to the laws of symmetry'**

Adventures

Consequently the mathematician has been forced to sit on the sidelines, especially in the secondary school, and watch wonders being provided for everyone except himself. In the primary area there has been a little more scope with mathematical adventures such as *L* and *Mathemagic Land.*

It's a fact that the area of mathematics has attracted some of the poorest software produced and this is especially true in infant and primary school mathematics.

Where does maths-based software begin and end? Whenever children use simulations like *Travel Agent (The Micro At Work,* Granada TV) or *Adventure Island*, *Mary Rose*, etc (Ginn & Co), considerable mathematical skills are being employed.

In a good primary classroom the boundaries between maths and other subjects are deliberately vague. There are, we think, several items of software which no mathematics scheme should be without, and it's our purpose this month to point these out. Hopefully, this will give a guide to teachers wishing to set up a core of supporting, mathematics curriculum software.

In the infant school good software is very thin on the ground. Many software packages tend to be too language orientated, often obscuring the mathematical intention for young readers. Other packages provide scant reinforcement activities between one level and the next.

One set of materials that gets the balance about right is *The First Maths Programme* from Shiva. The 11 packs in this programme deal with the development of numeracy and logic – a total of 55 programs in all, at just over £2 per program! The intended age range is from five-to-12-years-old although I doubt whether older (remedial) children will appreciate the language which is geared to suit the younger age groups. The programs allow children to practise basic numeracy skills and to show ability to use numbers in a variety of graphical ways. Each pack is designed to reinforce conventional mathematics teaching and will integrate with and enhance any maths scheme you are using in the classroom.

Infant gap

Unfortunately, many of the published mathematics schemes have disappointing software complementing them. Perhaps some of the best come from Heinemann supporting the SPMG (Scottish Primary Maths Group) scheme. However, the titles available at present are aimed at the top end of the primary

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All programs are datafile compatible with Matrix Operations program in UNIMAX package. Data matrix capacity examples (columns by rows): **CBM-64;** 2x1250, 5x700, 10x380, **BBC-B;** 2x750, 5x400, 10x200, **48K Spectrum;** 2x1800, 5x900, 10x500. **CBM-64** (disk only): **£85, BBC-B** (disk only): **£85, BBC-B** Torch and Acorn Z80 versions: **£100, 48K Spectrum** (mdvcart, RS232 option): **£60, 48K Spectrum** (cass): **£50.**

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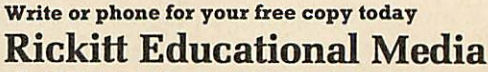
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school, still leaving that large gap at the infant level. *Pack3* (issue1) and *Pack1* (issue2) provide some very good activities with shapes. *Pack2* (issue1) provides excellent reinforcement to concepts of area.

Further up the school the computer becomes a vital tool in the area of mathematical investigations. (Using the classroom computer just to practise tables really cannot be justified: use 'Little Professors' instead – children love them). Where the school micro does have a valuable role in the maths scheme is in allowing children to investigate mathematical relationships in ways which are generally impractical by any other method. Take the age-old 'Jugs' problem: it's difficult to set up and monitor such a messy activity in a busy classroom. Here the computer can give fast and accurate responses to the childrens' actions. A suite of software which deals with a wide range of mathematical investigations is *Micro Smile 1* and *The Next 17*.

These 47 programs (less than £1 per program) cover various aspects of mathematics: logic, graphs, angles, fractions, place value, decimals, vectors, symmetry and problems, to mention only some. They are designed to provide learning resources for 11-to 16-year-olds although many of the programs can be used with younger, primary school children. Imagine the reaction to a problem like this when it's presented on paper: 501 – [(3x20) + (2x18) + (3x12)]. *Micro Smile's* 'Darts' game sets the problem in such a delightful way that calculations like this are solved without hesitation! Indeed some children are able to handle this type of problem mentally.

Micro Smile is an excellent addition to any school's software collection.

Value for money

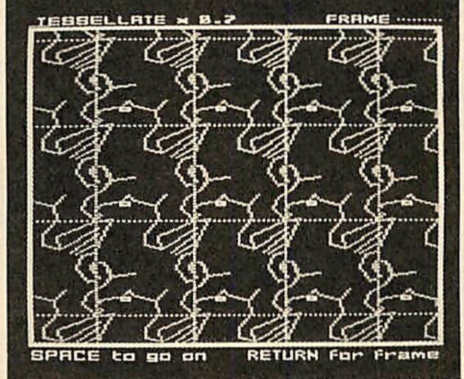
Anita Straker, the director of the Primary Project for the MEP, has produced a number of mathematics packs suitable for children further down the primary school. Marketed by Capital Media (MEP), they comprise *Maths Games* volumes 1 and 2 and *Mathematical Investigations in the Classroom* and each pack contains at least six programs. There is some degree of overlap with the *Micro Smile* programs but don't let this put you off as they are generally better-suited to young children and are of the same high standard as *Micro Smile.* Anita Straker is to be congratulated for developing software that, in the words of one of my infant-teaching colleagues: '. . . is pitched just right. With a perfect combination of thought-provoking activity and simple, clear instructions, even infant children can work on the tasks independently.'

Being MEP sponsored they offer excellent value for money and should be high on your list of software purchases.

If you want to use the classroom micro for practice in the four rules of number, *Arithmetic Plus* and *Money Plus* from Fernleaf Educational Software will also provide the added elements of problem solving, planning, strategy and making deductions. Each pack consists of a suite of four programs which need a good deal of hypothesising as well as skill at calculating. The language involved precludes their use by young children, but for the middle and upper primary school these packs provide an excellent stimulus and starting point for a variety of mathematical investigations.

Broadcast support

Many teachers use radio and TV broadcasts as a starting point for mathematics work. One of

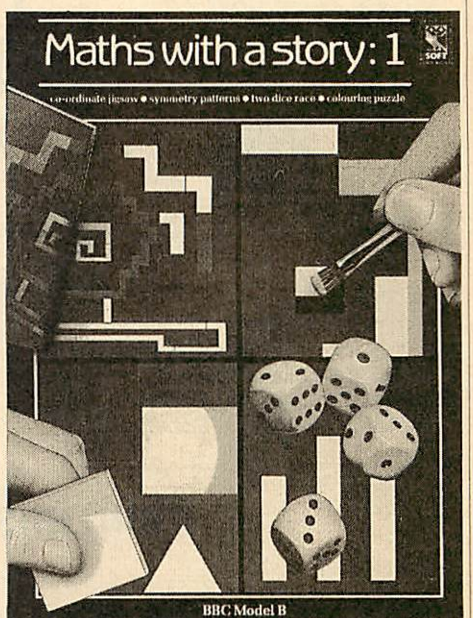


Tesselations: **'a very impressive and powerful tool'**

the best software-supported series has been *Maths with a Story*, broadcast by BBC Schools Radio. BBC Publications has released eight programs in two packs: *Maths with a Story I & II.* The radio programmes are entertaining enough but just watch a group of children using the software. Aimed at seven to 10-year-olds, to describe these programs as absorbing doesn't really do them justice. Although the software complements the series it can stand alone. The setting up procedures are quickly learnt and the langauge used is simple, although correct mathematical terms are used where appropriate. Each pack offers some delightful software which is both inspiring and fresh, proving that mathematical material does not have to be dreary 'drill and practice'. My favourite is the *Tile Stretch Game* – it gives a whole new dimension to tiling! *Maths with a Story I & II* is as useful at home as it is in the classroom – I eagerly await pack III.

There are a number of simulations available which involve using mathematical skills but by far the most popular one in our primary school is *Cars – Maths in Motion* from Cambridgeshire Software House Ltd.

Each participating group adopts the role of a Grand Prix racing team whose aim is to win



Maths with a Story: **'one of the best'**

as many Grand Prix during the year on a number of different circuits. Angles, ratios, percentages, probability, arithmetic skills all combine in the group's attempts to tune their car and successfully complete a practice round. I have had a class working for a whole day on mathematics and enjoying every minute of it! Presented much in the same way as some of the renowned Ginn & Co simulations, this excellent program is a must for the mathematics resource shelf.

When you begin to examine the range of maths software available you immediately notice that it nearly always falls into two categories – simple and pretty or mind-bogglingly complex and functional. The divide also comes on the transfer from junior to secondary age range and is explained (presumably) by the fact that equations and their related calculations cannot be presented in a fascinating manner. The other aspect of this is that these advanced programs also tend to be of the 'drill and practice followed by a test' variety – something which has been generally discredited for some time now.

There are exceptions to this of course, and yet even they tend to fall into certain slots. The programs which are visually stimulating in secondary maths are usually to do with vectors or graphs or have stimulating graphics as an end result of the calculations involved. An example of this type of program is *Symmetry* from Acornsoft – a pleasant and entertaining program containing plenty of tutorial and activities related to the various laws of symmetry such as Pascal's Triangle, reflective and rotational symmetry.

This is very effective as a tutorial medium and would find a place in both junior and secondary software libraries.

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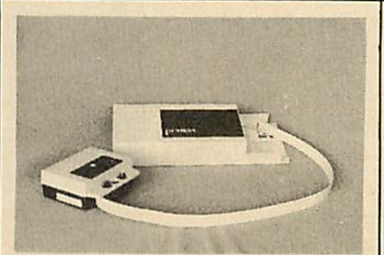


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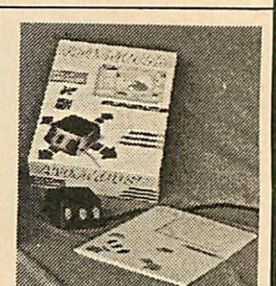
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Cross-curricular

Another of the same kind is *Tessellations* from Cambridge Micro Software – a very impressive and powerful tool for creating tessellating patterns. To quote the blurb, it allows users to draw tessellating shapes with the computer automatically providing symmetry in any one of 17 possible symmetry groups. The end result may be printed and this alone makes you wonder whether the software should be in the maths department or the art room. Good cross-curricular stuff!

Making Ends Meet: **maths and personal finance**

You may think that the best materials created for this subject have been produced by mathematicians. Any maths teacher who is seriously interested in different methods of approaching the subject would do well to get in touch with the Association of Teachers in Mathematics (ATM). This organisation produces a wide range of books, software – including *L* – and resource materials for the classroom. ATM produce a compilation of software called *Some Lessons in Mathematics with a Microcomputer*, and this excellent book and disc bring together some fine examples of lateral thinking in mathematics. One of the contributors, Derek Ball, has been producing interesting ideas for some time and I remember a demonstration by him at Hull University where he held a large audience of children, teachers, advisers and MEP worthies spellbound with his program *Circles*. As is the case with so much software, it is not the package itself which provides the 'sparkle', it's the teacher using it. This particular package contains 11 programs dealing with loci, structures with cubes, probability, number squares, geometric transformations, equations and a visually exciting program called *Takehalf*. This dissects a square in a myriad of ways producing very exciting stiumuli, not only to mathematical contemplation of the properties of the square but also of its artistic potential.

Secondary group

Membership of ATM is £16 a year or £14 if you pay by standing order. Another organisation with a good deal to offer the mathematician is MUSE – Microcomputer Users in Secondary Education. Its present catalogue contains 32 items which are aimed at secondary or junior/secondary age ranges. The price of these packages averages out at around £5 per item and authors include Anita Straker and Adrian Oldknow. MUSE has a reputation for no-nonsense, no-frills packages which get straight to the point and deal with the topic thoroughly. All packages have been assessed by teachers and their inclusion in the catalogue is something of a recommendation.

Another group is the Mathematics in Education and Industry Schools Project, which produces a disc called *Programs for Mathematical Computing*, aimed at the secondary school only. The educational pedigree of this organisation is impeccable since they have also been involved in the development of the MEI GCSE proposals. The disc contains items on graph plotting, probability and statistics, numerical methods and transformations.

Relevant

One of the main benefits of using a computer is that it can bring to life the dull facts of any particular lesson. This is done by creating a situation in which the principles involved must be used, actively, by the pupils. Their involvement with the situation and their desire to bring it to a satisfactory conclusion provide a strong motivation for learning. The problem in maths is that, apart from an adventure scenario where the player must solve the problems to get to their objective, there are very few ways of putting over the esoteric ideas of mathematics. A package which deals with one aspect of maths that will have immediate relevance to most secondary children is *Making Ends Meet* from Cambridge Micro Software. This pack is more likely to appear in the personal and social development area than in maths and yet the maths that most children use regularly are involved with their personal finances – especially when they first leave home. This excellent package allows the child to experience the problems of stretching a wage and is very realistic in the way it provides the pitfalls – both expected and unexpected: the lure of an outing with friends may upset the budget; the car which seemed to be a good financial proposition when first bought begins to fall apart; savings are eroded and the bank manager gets restless.

Children love this type of program and gain real benefit from it since, while they' play', they also learn the hard facts which the simulation is attempting to convey.

Mathematics is a problem area for many teachers: materials are available but they tend to be few and far between. The most logical approach for most teachers is to join an organisation which will provide news of new materials and software.

PRODUCTS AND SUPPLIERS

The Primary Maths Programme, £119.25 (complete suite of 11 packs); £13 (individual packs – disc and cassette); £6.95 (Number Games book), BBC B
ESM (Shiva), Duke Street, Wisbech, Cambridgeshire PE13 2AE. Tel: (0945) 63441.

Micro Smile 1, £15, BBC B disc
Centre for Learning Resources, 275 Kennington Lane, London SE11 5QZ.

The Next 17, £13.50, BBC B disc
Centre for Learning Resources, as above

Maths Games 1, £8.50, BBC B disc
Capital Media, c/o ILECC, John Ruskin Street, London SE5 0PQ. Tel: 01-735 9123.

Maths Games 2, £8.50, BBC B disc
Capital Media, c/o ILECC, John Ruskin Street, London SE5 0PQ.

Mathematical Investigations, £8.50, BBC B disc
Capital Media, c/o ILECC, John Ruskin Street, London SE5 0PQ.

Arithmetic Plus and **Money Plus,** £30 each, BBC B/B+ cassette and disc (individual programs available separately)
Fernleaf Educational Software, Fernleaf House, 31 Old Road East, Gravesend, Kent DA11 0LH. Tel: (0474) 359037.

Maths with a Story 1 & 2, £10.95 each, Electron and BBC B cassette transferrable to disc
BBC Publications, PO Box 234, London SE1 3TH. Tel: 01-407 6961.

Car – Maths in motion, £21.85, BBC B
Cambridgeshire Software House, The Town Hall, St. Ives, Huntingdon, Cambridgeshire.

Some Lessons in Mathematics with a Microcomputer, £15
Association of Teachers of Mathematics, Kings Chambers, Queen Street, Derby DE1 3DA.

Symmetry, £14.95
Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD Tel: (0223) 214411.

Tessellations, £21
Cambridge Micro Software, Shaftesbury Road, Cambridge CB2 2RU.

Making Ends Meet, £15
Cambridge Micro Software, Shaftesbury Road, Cambridge CB2 2RU.

Programs for Mathematical Computing, £20
MEI Schools Project, 41a West Street, Oundle, Peterborough PE8 4EJ.

NETWORKS

COME IN FROM THE COLD

Welcome to the first of the *Acorn User* network pages. Users of the Econet, E-net and other similar Beeb networks can now come in out of the cold! Are you frustrated by your network, or have you discovered fantastic things to do with it? Either way we want to hear from you. We will pay for any helpful tips which are published, or thought-provoking ideas on such topics as how to persuade software suppliers to make their programs available in a form suitable to be put on the network.

It is not intended at present to publish lengthy network programs, but who knows: from little acorns . . .

This month we concentrate on Econet, but if users of other BBC micro network systems wish to contribute, we will welcome their views. To kick off with, here is a general collection of facts, hints and news.

USER SUPPORT GROUPS

At present I am aware of the following:
The Berkshire Econet Support Group (contact George Hawes, Brakenhale School, Computer Unit, Rectory Lane, Bracknell, Berkshire RG12 4BA).The SJ Users Group (contact Humphrey Berridge, The Computer Laboratory, Wellington College, Berkshire RG11 7PU). The National Econet Users Club, c/o Michael Ryan, XOB, Balkeerie, Eassie, Forfar, Angus DD8 1SR. Any others, please let us know!

SOFTWARE PET HATE

The pet-hate of most network managers is how to install software on their network and there are two main problems here. First, the software may be protected so it can't be copied from the original disc or tape, and second, the program(s) may need to be modified to remove disc- or tape-specific commands (eg, *DISC) in order to run on the network.

The first of these can only (legally) be solved by exerting pressure on software suppliers to take note of the increasing network market – the more users make a nuisance of themselves the more likely this is to happen. Happily several suppliers do now produce network versions of their software. The catch is that you often have to pay much more for it, which is reasonable, as you will probably be using the software simultaneously on several machines. Acorn now grants network licences for most of the Acornsoft non-games titles. Typically these cost about £300 plus VAT for 10 ROMs of the software, for example, Logo, or for a licence to use a disc copy in sideways RAM.

BBC Soft titles are more attractively priced, costing double the normal retail price of the software. Other software suppliers, for example Longmans, Hutchinson, Logotron, etc, also offer network licences but there is no doubt that it is expensive to buy software network licences, and most schools simply cannot afford many such titles. The following list gives some of the points to watch out for it you're modifying unprotected software.

Change all *DISC and *TAPE commands to *NET. Another tip is to have a file called 'disc'

Calling all Econet users . . . send us your hints and tips and we'll pay for those we publish

NETWORKS

in your network library which does nothing! This can be produced by typing ?&A00=&60 followed by *SAVE DISC A00+1.

Watch out for *ACCESS commands. *ACCESS nnnn L on a disc program must be changed to *ACCESS nnnn LR/ on the net. Similarly *ACCESS nnnn must be changed to *ACCESS nnnn R/ where nnnn is the program name. Programs which are loaded on disc at PAGE &1900 and then downloaded to &E00 can also be made to work on the network. In this case try inserting the command *FX143,12,255 after the program is loaded, but before it is copied down to PAGE &E00. This command will effectively disable the network until Break is pushed. After such a program is run, you will have to type CTRL-Break and log on again from scratch.

Programs which read disc sectors directly are a problem and generally need extensive modification. However, in my experience very few programs cannot be run on the network if you persevere long enough!

A second problem area concerns the use of printers on the network. Unfortunately if you have version NFS3.34 of the Network Filing System ROM in your network, it's not possible to perform network printer dumps, although I have heard rumours of a patch produced by Barnsley ITEC which overcomes this. With NFS3.60 (contained in the DNFS ROM) there is no problem. At present Acorn do not have an official upgrade service, and the DNFS ROM is rather expensive if you have to re-equip a whole network!

Another problem is that it's difficult to select the network printer from certain ROMs, for example, *Wordwise*.

The reason for this is not clear, but it appears to be a problem associated with the Acorn Printer Server ROM 1.00 as the problem does not arise when using the SJ printer server incorporated with their fileservers. The problem can be overcome in a somewhat messy but viable manner.

First, make sure that you have selected no banner or endtext on the printer server by typing *NOBANNER <Return> and *ENDTEXT <Return> on the printer server machine. Then from the client machine running *Wordwise* return to Basic (*B.), select the network printer (*FX5,4), set the printer, ignore character if necessary (*FX6,0), and then turn the printer on and off again (CTRL-B then CTRL-C). Finally, re-enter *Wordwise* (*W.) and answer Y in response to the 'Old Text Y/N' prompt. You can now print to the network printer using function 6 as usual. Unfortunately this procedure has to be repeated each time you have to reselect the printer, ie, after someone else has grabbed it from you. The entire sequence can be entered on a function key thus:

*KEY0*B.|M*FX5,4|M*FX6,0|M|B|C*W.|MY <Return>

This is then activated from within *Wordwise* with CTRL-Shift-f0. The above assumes that your printer server is on machine 235, the default value. If not you should type *PS <nnn> before entering *Wordwise*, where <nnn> is the number of your printer server machine.

The third most frequently aired problem concerns the abysmal speed with which the network deals with file-handling – this renders many file-handling programs next-to-useless. The problem occurs because Basic writes characters to a file one-by-one when using PRINT#, and the network overheads (where the byte is coming from and where it is going to, etc) make this a very inefficient process.

Fortunately partial solutions are now available which locally buffer the bytes and then send them in larger groups. For use with serial files (eg, *Wordwise* text files), EXEC and SPOOL files, and files which are written and read sequentially from BASIC programs, various utilities have been written which can be loaded from the network library. Such a utility is PUTGET and is available from SJ Research, 108 Mill Road, Cambridge CB1 2BD. Tel: (0223) 69927, and also from the MUSE Software Library, PO Box 43, Hull HU1 2HD. Tel: (0482) 20268, as part of a disc of various network utilities. A similar utility is also available from Wellington College.

George Hawes of the Berkshire Econet Support Group has supplied detailed figures which show that about 74 bytes are required for a single byte network transfer. A 255 byte string would there cause over 19000 bytes to be sent using PRINT#H%,A$! By using the utility this can be reduced to an overhead of some 74 bytes per 256 data bytes, an improvement of some 77 per cent in efficiency.

Random access files need more sophisticated utilities, which take up quite a lot of room. At work (Oundle School) we have recently completed a ROM-based extension which allows buffering of random access files only, and it is hoped to make versions of this available soon. Acorn has also solved the problem in their ANFS network chip which is supplied with the new Master series machines. This may be made available for older Beeb models later, but although it solves that particular problem very well, it raises PAGE to &1900 on models B/B+, and it is very difficult to go below this value without the network crashing! The Dundle extension only raises PAGE to &1300, and it can be switched off when not required.

DATABASE PACKAGE

PRENTICE HALL INTERNATIONAL PERSONAL COMPUTER BOOK

NETWORKING WITH THE BBC MICROCOMPUTER

R. G. NAPIER

Help for networking newcomers

Coming soon from Acorn is a comprehensive database package especially written for the network. This was demonstrated at the recent Hi-Tech exhibition, and looks like being a useful addition. The price will be around £200 including network licence.

GOOD GUIDE FOR BEGINNERS

Networking with the BBC Microcomputer by R G Napier, Prentice Hall 1984.

A good guide, particularly for beginners.

The Econet Micro Guide by Chris Dawkins, Longmans 1985.

More technical, but extremely useful for those who want to understand their work.

Send your contributions to The Network Page, Acorn User, *141-143 Drury Lane, London WC2B 5TF.*

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In addition to the time saving operations performed by this module you can also obtain valuable management information such as debtor lists, which can be printed together with telephone numbers. It is also possible to query any particular account and obtain an up to date picture of the position.

STOCK CONTROL MODULE £25



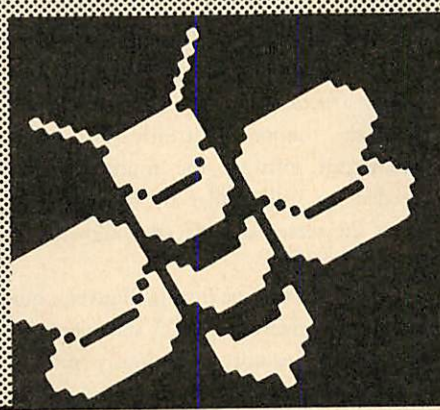
The stock control module is used in conjunction with the invoice program and is updated whenever an invoice is issued. It is then possible to automatically search the stock file for out of stock or re-order level items. Purchase orders can then be printed, automatically if required.

As with the Accounts Receivable there are many forms of management information available including stock numbers and values both numerically and as a percentage figure. This enables you to identify slow or fast moving parts easily.

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A twin double sided drive is required for the STOCK CONTROL module.

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- PACK is a very powerful routine which removes REMs & spaces and forms multi statement lines in a very intelligent way
- RENUM is a partial renumber facility
- XREF allows you to cross reference your program
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- DEDIT a robust disc sector editor
- DFIND to search a disc for a string
- DGET/DPUT to load or save sectors
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- MENU to load programs from a disc with a BROM menu
- XCOPY to selectively copy files from disc to disc
- XDEL to selectively delete files from a disc
- MEDIT to view and edit memory - FAST
- ROMLIST lists all ROMs and their current status
- ROMON & ROMOFF which enable you to turn on/off sideways ROMs even after CTRL/BREAK.

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MICRO USER August '85

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ACORN FORUM

Whether you've got a Master, BBC micro, Electron or Atom, *Acorn User* readers have some good ideas for your micro. Presented by Mike Barwise and Bruce Smith

£20

64 COLUMN QUESTION

Two very useful routines earn Jonathan Temple of Beeston a £20 note. Jonathan can tell you all about them . . .

A useful feature of the BBC micro, Master and Electron is their 80-column capability in modes 0 and 3. However, for those of us with televisions rather than monitors, working with these modes is difficult and likely to cause eye-strain. Also both modes use a large amount of memory, cutting down their usefulness.

The short procedure presented here gets round some of these problems, allowing a 64-column display in mode 4 – thereby saving 6k over mode 3 while being more readable. The procedure should be used by a call like:

PROCsmall (X, Y, T$)

where X is the horizontal tab position in the range 0-63, Y is the vertical tab position in the range 0-31 and T$ is the text to be printed.

```
   10 REM 64 column mode 4 display
   20 REM by Jonathan Temple
   30 REM for BBC B/B+/M/E
   40 REM (c) Acorn User June 1986
   50 :
   60 MODE 4
   70 PROCsmall(10,8,"Sixty-four c
olumns in Mode 4:  DEMONSTRATION")
   80 PROCsmall(10,10,"The quick b
rown fox jumps over the lazy dog")
   90 PROCsmall(10,12,"THE QUICK B
ROWN FOX JUMPS OVER THE LAZY DOG")
  100 END
  110 :
  120 DEF PROCsmall(V%,W%,M$)
  130 LOCAL A%,B%,D%,L%,M%
  140 V%=V%*20-20
  150 W%=28+(31-W%)*32
  160 VDU 5
  170 GCOL 0,1
  180 FOR L%=1 TO LEN(M$)
  190 M%=&C000+(ASC MID$(M$,L%)-32
)*8
  200 VDU 23,255
  210 FOR D%=0 TO 7
  220 A%=M%?D%
  230 B%=(A% AND96)*2+(A% AND12)*4
+(A% AND 1)*8
  240 VDU B%
  250 NEXT
  260 MOVE V%+L%*20,W%
  270 VDU 255
  280 NEXT
  290 VDU 4
  300 ENDPROC
```

Listing 1. Allows a 64-column display in mode 4

The program (listing 1) works by reducing each character from an eight by eight matrix to a five by eight matrix as it is printed; bits 1,4 and 7 are omitted to achieve this (see line 210). The character is then printed using VDU 5 and this is the reason the program will not work in mode 6. As it stands the program is slightly slow and is really only a demonstration of a technique. Lines 180-230 could easily be converted to machine code, using the AND and LSR instructions for line 220, which would speed the routine up greatly. For practical commercial software the routine could be speeded up still further by re-writing it to access the screen directly, also allowing it to work in mode 6.

```
   10 REM Auto data statements
   20 REM by Jonathan Temple
   30 REM for BBC B/B+/M/E
   40 REM (c) Acorn User June 1986
   50 :
   60 REM Convert VDU characters
   70 REM into DATA statements
   80 PROCdata(&C00,&CFF,2000,8,0)
   90 END
  100 :
10000 DEF PROCdata(S%,F%,L%,N%,Q%)
10010 IF Q% IF (1+F%-S%) MOD N% RE
PEAT F%=F%+1:UNTIL (1+F%-S%) MOD N
%=0
10020 IF S%>F% THEN VDU 7:ENDPROC
10030 A$="":FOR M%=S% TO S%+N%-1
10040 A$=A$+STR$(?M%)+",":NEXT
10050 S%=S%+N%
10060 $&700="K.9 "+STR$(L%)+"D."+A
$+CHR$127+"|MPROCdata(S%,F%,L%+10,
N%,1)|M"
10070 X%=0:Y%=7:CALL &FFF7
10080 *FX 138,0,137
10090 END
```

Listing 2. Creates DATA statements

The second routine (listing 2) gives a quick, easy way of creating DATA statements from an area of memory. Previously published routines have all been lengthy machine code, but this program accomplishes the task with a short Basic procedure and a function key. To use it, call PROCdata using:

PROCdata (S,F,L,N,Q)

where S is the starting place in memory, F is the finishing place in memory, L is the line number for the first line of DATA and N is the number of data items per line. Note that Q should always be 0 when calling the routine.

PROCdata(&C00,&CFF,2000,8,0) for example, would store the present user-defined characters in DATA statements starting at line 2000, with eight numbers on each line.

If you get the error messages 'String too long' or 'Bad key', it means you are using too many items per line; try again with a smaller number, remembering to delete any DATA lines created before the error. Once the DATA statements have been created PROCdata can be deleted and the DATA read back in using a suitable routine.

The procedure can also be modified to produce hex data by placing a tilde () between the STR$ and (M%) in line 10040.

The routine works by defining f9 as the next DATA line (lines 10060-10070) and then using *FX138 to enter it into the keyboard buffer (line 10080). Also included in the key definition is a call to PROCdata so that the program can do the next line, although this time the 'Q%' parameter is set to 1.

£20

FAST FOURIER TRANSFORM

Andrew Luck of Coningsby, Lincs, has created a neat demonstration of the Fast Fourier Transform function. The accompanying program, listing 3, is in Atom Basic, but conversion to BBC Basic should pose no problems (see *AU* April '84, page 133). Andrew writes:

A 12k Atom with a Floating Point ROM will be needed for this program. A Fast Fourier Transform may be represented as a black box into which a sequence of numbers is pushed. After a short delay, a different sequence of numbers is returned. This output data is the frequency spectrum of the input signal, eg a sine wave would be converted into a single spike as it consists of a single frequency.

Some way must be found to input the data to the FFT. One method is to use an Analogue to Digital Converter (ADC) to sample a waveform directly. Alternatively, a few lines of code can be written to generate the numbers. In the example program, lines 100 to 140 generate a seven-cycle clipped sinewave. The input data is stored in a floating point array %RR().

The FFT function is then applied to this array. The result is returned to complex number form, with the real part in array %RR() and the imaginary part in array %II(). These numbers are then displayed graphically by lines 210 to 270.

To speed up the operation of the transform the bit reversal routine is performed by a short machine code routine – lines 390-430. The transform then takes 18 seconds to analyse 128 data points on an Atom running at 2MHz.

The variable Q in line 50 determines the number of data points to be used. To simplify operation this is specified as a power of two. Seven is the maximum possible on a 12k Atom which results in 128 data points. The bigger the number, the better the results, but it takes longer to compute the results and more memo-

ry is needed for the arrays which grow exponentially in size.

The FFT exhibits several peculiarities. First, the data is interpreted as being cyclic, ie, the right-hand end joined to the left-hand end. For example, if a sine wave is entered with exactly 30 cycles in 128 points, the output will be zero except for a spike at 30 cycles. However, if the input has 30.5 cycles a spike is produced with wings. This is due to the sharp step in the input produced at the join generating a range of spurious spectral signals. Normally these signals are insignificant.

Second, if 128 data points are entered, 128 points are output from the FFT, but points 64 to 127 are mirror-images of points 0 to 63. This occurs because the graph routine shows the square of the two arrays %RR and %II. If the contents of these arrays are printed numerically it will be seen that the upper points usually have the opposite sign to the lower, in one array at least. Amplitude (A) of each spectral element is given by the formula:

%A = SQR(RR(X) ^2 + II(X) ^2)

where X is the array position of the element.

Additionally, phase information on the spectral elements is available from the following calculation: ARCSIN(%II(X)/%A) where %A is the amplitude as calculated above for each element as required. Note that the angle is given in radians, and also that when %A equals zero a 'division by zero' error will result.

As can be seen from this, plenty of scope is left for changes in the presentation of the data to suit individual requirements. FFTs present the fastest way of carrying out frequency analysis on complex waveforms and circuits . . .

My only comments are: first, I don't approve of Atoms running at 2MHz (I ran this program at 1MHz and it did not take unduly long), and second, perhaps Andrew or another reader could follow up on how to interpret FFT results. Conversion of the program from a demo to a real input FFT simply requires the user's capture and scaling routine to be substituted for lines 100 through 140.

For BBC micro users, LINK £FFE3 is used here as 'wait for keypress before continuing'.

```
 10REM** FFT PROGRAM **
 20P.''"WAIT..."
 30Q=7;DIMLL1;GOS.e
 40P=Q-1
 50%F=0.1;R=%(2^Q+%F-1)
 60FDIM%TTR,%RRR,%IIR,%CCR,%SSR
 70REM LOOK UP TABLE COMPUTATION
 80%K=2*PI/(R+1);F.X=0TOR
 90%CCX=COS(%K*X);%SSX=SIN(%K*X);%IIX=0;N.
100REM:GENERATE INPUT DATA
110%K=2*PI*7/(R+1)
120F.X=0TOR;%RRX=2.5*SIN(%K*X);FIF%RRX>.9;%RRX=.9
130FIF%RRX<-.9;%RRX=-.9
140N.
150REM DRAW INPUT GRAPH
160CLEAR4;MOVE0,96
170F.X=0TOR;A=95+%(%RRX*80);PLOT13,(X*2),A;N.;LI.£FFE3
180CLEAR0
190REM THIS IS THE FFT
200P."FFT:"';GOS.a;GOS.b
210REM DRAW OUTPUT GRAPH
220CLEAR4
230F.X=0TO(R/2);A=2*SQR(%RRX*%RRX+%IIX*%IIX)
240IFA>185A=185
250I=X*4+1
260MOVEI,0;DRAWI,A
270N.;LI.£FFE3;CLEAR0;?£E1=£80;E.
280REM BIT REVERSAL ROUTINE
290aF.X=0TOR;LI.£81;Y=?£80;IFY<=X G.d
300%I=%RRY;%RRY=%RRX;%RRX=%I
310dN.;R.
320REM FFT SUBROUTINE
330bF.S=0TOP;P."STAGE"S';T=%(2^S+%F);D=%(2^(P-S)+%F)
340F.Z=0TOT-1
350L=%(D*Z+%F);F.I=0TOD-1;A=2*I*T+Z;B=A+T;%W=%RRA;%J=%IIA
360%C=%CCL*%RRB;%G=%SSL*%IIB;%H=%SSL*%RRB;%M=%CCL*%IIB
370%RRA=%W+%C-%G;%IIA=%J+%H+%M
380%RRB=%W-%C+%G;%IIB=%J-%H-%M
390N.;N.;N.;R.
400eP=£81;P.$21;[
410LDA@0;STA£80
420TXA;LDX@Q
430:LLO ROR A;ROL£80
440DEX;BNE LLO;RTS;];P.$6;R.
```

Listing 3. Andrew Luck's demonstration of the Fast Fourier Transform function for the Atom

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```
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LDX #&00
LDY #&00
JSR osbyte
```

or

```
PHA
TXA:PHA
TYA:PHA
```

or

```
LDA #&7
JSR osasci
```

There is no need to type these out each time. They can be written as *View* macros, and defined like this (the stored commands are in bold type):

```
DM OB
     LDA #&@0
     LDX #&@1
     LDY #&@2
     JSR osbyte
EM
```

or

```
DM PS
     PHA
     TXA:PHA
     TYA:PHA
EM
```

or

```
DM BP
     LDA #&07
     JSR osasci
EM
```

Then, every time an OSBYTE call is needed in the program, use the macro. OB 80,1,0 will read the joystick channel 1 (OSBYTE call with A = &80, X = 1, Y = 0), and PS BP will save processor registers and beep.

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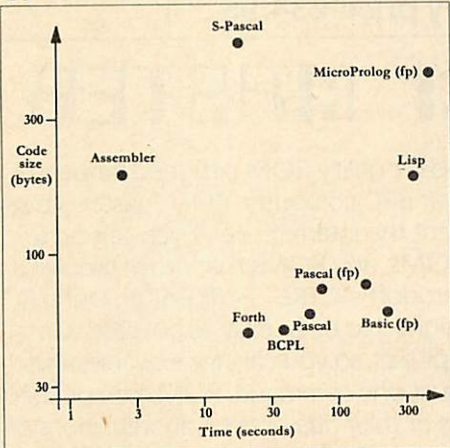
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SIX OF THE BEST AGAINST THE CLOCK

David Johnson-Davies discovers how different languages cope with the *Tak* test

Six very different programming languages, all currently available for the BBC micro are compared in their performance of the same simple function. The aim is to give a flavour of each one to readers who are interested in exploring new languages for their own sake, or for those who need to choose the most appropriate for a particular application.

The function chosen for the benchmark, *Tak*, is a variant of the recursive Takeuchi function devised by Ikuo Takeuchi of Japan; see listing 1 for a description of it in Pascal. The function is quite interesting, and provides a good test of recursive sub-routine calling and parameter passing. The results are particularly relevant to applications such as language parsing and compiling, problem-solving and applications in artificial intelligence (AI). *Tak* tests operations fundamental to any programming language, and although the languages that do well on *Tak* may have deficiencies for other applications, it is difficult to imagine a language that performs badly on *Tak* being much use for anything!



How the six languages performed

In each case the benchmark evaluates *Tak* (18,12,6) which has the value 7; with these arguments the function makes 63,609 function calls and performs 47,706 subtractions by 1. The depth of recursion is never greater than 18. In writing the benchmarks an attempt was made to show each language in the best light, by marking small optimisations where possible; for example, in some languages it was quicker to invert the test 'y<x' and exchange the 'then' and 'else' clauses. The comparison was made, in each case, for integer and floating-point arithmetic where available. The integer precision is 16-bit except in the case of BBC Basic, which provides 32-bit integers. All of the benchmarks were run on a 6502 second processor, using second-processor versions of the languages where available.

```
{$D-,R-,U-}
{Tak function}
program taktest (input,output);

function tak(x,y,z:integer): integer;
begin
   if y<x then tak:=tak( tak(x-1,y,z), tak(y-1,z,x), tak(z-1,x,y) )
           else tak:=z
end;

{main program}

begin
   settime(0);
   write('tak=',tak(18,12,6),' time=',time)
end.
```

Listing 1: the ISO-Pascal version is a natural language for this type of application

```
   10 REM TAK FUNCTION
   30 TIME=0
   35 PRINT"FNT(";A;",";B;",";C;")=";FNT(A,B,C)
   40 PRINTTIME/100;" SECS."
   50 END
   60 DEFFNT(X%,Y%,Z%)IFX%<=Y%=Z%ELSE=
FNT(FNT(X%-1,Y%,Z%),FNT(Y%-1,Z%,X%),FNT(Z%-1,X%,Y%))
```

Listing 2: BBC Basic is straightforward apart from final refinements to improve timing

Pascal benchmark



The ISO-Pascal version of the benchmark is a straightforward expression of the *Tak* algorithm, and was easy to program and test (listing 1). In fact, Pascal is a very natural language in which to express this type of application. The options D–, R–, and U– omit all checking code for fastest possible execution. The same program was also tested using the Acornsoft *S-Pascal* compiler; as 'settime' and 'time' functions are not available in this version, they must be removed and timing performed with a stopwatch instead!

Basic benchmark

The BBC Basic benchmark is straightforward, apart from the final refinements to improve execution time (see listing 2).

Because the language is interpreted, each unnecessary space in the program takes an extra 6 µsecs whenever the line containing it is executed, and so spaces are omitted from the function definition.

Also, each extra character in the function name costs about 18 µsecs per call, so shortening the function name from FNTAK to FNT saves about 2.3 seconds overall.

Finally, because X%>Y% for only one quarter of the calls, less characters have to be scanned if the two parts of the IF...THEN...ELSE statement are exchanged, again reducing execution time.

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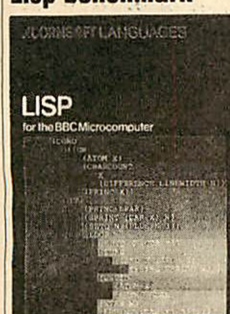
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LANGUAGES

Lisp benchmark



The Lisp version (listing 3) is again a straightforward expression of the function, taking advantage of the SUB1 function which returns less than its parameter.

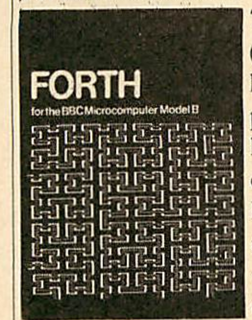
Function calls in Lisp are written as a bracketed list, with the function name first, followed by the parameters: (TAK 18 12 6) evaluates the benchmark. The equivalent of the conditional statement:

IF test THEN b ELSE c

is Lisp's conditional function:

(COND (test b) (T c))

Forth benchmark



The Forth version (listing 4) was the hardest to write and is probably also the hardest to follow, even for experienced Forth programmers; it takes some calculating with pencil and paper to verify that the program does indeed correspond to the more self-evident versions such as the Pascal and Basic ones.

The words R: . . . R; enclose the function definition for *Tak*. These are identical in behaviour to : . . . ; but allow the function being defined to refer to itself in a recursive fashion.

Note that the parameters are taken from the stack in the reverse order; this makes the program come out slightly more neatly, because X and Y are then on the top of the stack ready to be compared, and the ELSE clause can drop them with a 2DROP leaving just Z on the stack to be returned.

MicroProlog benchmark

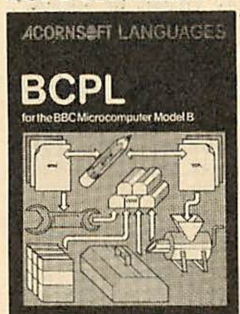


The MicroProlog benchmark is also reasonably straightforward to write, except that keeping track of the 10 variable names needed is a headache (listing 5)! However, there are two subtle aspects of the function definition that are potential pitfalls for the unwary. The innocuous '/' in the middle of the function definition prevents back-tracking, and tells the interpreter that the *Tak* function only has one value. Without this the function rapidly runs out of space for larger arguments, and runs slower for smaller ones.

Another subtlety is that the order of the clauses is critical. If the final clause *(Tak* x2 y2 z2 x) is given before the other three, the program will not run at all but with care the MicroProlog version performs quite well.

Surprisingly, by adding one line to the MicroProlog listing it is possible to make it run more than 10 times faster – in just 22 secs – while still evaluating the function correctly. However, since the program then no longer strictly performs the specified benchmark, the method will be left as a puzzle to be revealed in a future issue (if readers don't spot what it is before then).

BCPL benchmark



The BCPL benchmark (listing 6) uses the alternative conditional construct to:

TEST test THEN a: = b ELSE a: = c

which is:

a: = test – > b,c

and which provides a particularly concise way of writing the function.

Language	Code Size (bytes)	Time (secs)
Assembler	215	2.64
S-Pascal	424 (machine code)	19
Forth	58	21
BCPL	60 (CLINTCODE)	42
ISO-Pascal	68 (BL code)	70
ISO-Pascal (FP)	80 (BL code)	79
Basic	82	185
Basic (FP)	67	248
Lisp	204	326
MicroProlog (FP)	366	359

Table 1. Results of the 10 versions of the *Tak* benchmark

```
(DEFUN TAK (X Y Z)
   (COND
      ((LESSP Y X)
         (TAK
            (TAK (SUB1 X) Y Z)
            (TAK (SUB1 Y) Z X)
            (TAK (SUB1 Z) X Y)))
      (T Z)))

(DEFUN TEST ()
   (RESET)
   (PRINT (TAK 18 12 6))
   (PRINT (LIST (TIME) (GCTIME))))
```

Listing 3: Lisp is straightforward expression

```
( TAK FUNCTION )
R: TAK ( Z Y X )
2DUP <
IF DUP 2OVER DUP 2OVER 1- TAK
   >R 1- TAK
   >R 1- TAK
   R> R> SWAP ROT TAK
ELSE 2DROP
THEN R;

: TEST 6 12 18 TAK . ;
```

Listing 4: Forth is hardest to write and follow

```
((tak X Y Z x)
  (LESS Y X)
  (SUM x1 1 X)
  (SUM y1 1 Y)
  (SUM z1 1 Z)
  /
  (tak x1 Y Z x2)
  (tak y1 Z X y2)
  (tak z1 X Y z2)
  (tak x2 y2 z2 x))

((tak X Y Z Z))

((test)
  (TIME 0)
  (tak 18 12 6 y)
  (TIME z)
  (PP y)
  (PP z))
```

Listing 5: MicroProlog has potential pitfalls

Machine code benchmark

Finally, in order to provide a baseline against which to measure the performance of the higher-level languages, a version of the *Tak* function was hand-coded in machine code, and this probably represents close to the best possible performance for a standard BBC micro (see listing 7).

The assembler version uses 16-bit arithmetic for strict comparison with the other versions; in retrospect it probably would have been better to specify the benchmark task as the evaluation of *Tak* (10018,10012,10006) to rule out the possibility of using 8-bit arithmetic. (The answer is 10007, incidentally).

The machine code version uses a software stack, with the x-register as stack pointer, for

passing the parameters to the function and returning the result. Macros, defined using BBC Basic function definitions, are used to avoid having to write the same code several times for repeated operations. These 'macro' functions are used as operands to the OPT assembler directive; this causes them to be evaluated from within the assembler, and they return the value 'pass' to leave the OPT status unaffected. The parameters supplied to these macros are the positions of the arguments on the stack.

The resulting performance of the seven versions of the *Tak* function is shown in table 1, in order of speed. The results are also shown graphically in figure 1: code size is shown on the horizontal axis, and speed on the vertical axis, both plotted on logarithmic scales. In each case the code size represents the overhead in memory usage of adding the function definition to the system; no account is taken of the amount of memory occupied up by an interpreter, if present.

Conclusions

Apart from the assembler implementation, the Forth version was the hardest to write and debug, but the effort paid off: it was almost as fast as the machine code generated by S-Pascal, and its internal threaded code is far more compact.

ISO-Pascal and BCPL both interpret intermediate code, and give similar performance, so the choice between them really depends on which language you prefer.

For this example, BCPL generated the more compact intermediate code, and ran substantially faster, but Pascal has the advantage of built-in floating point arithmetic, and a subset of the language can be compiled down to machine code with S-Pascal.

Of the three interpreted languages tested, Basic is the fastest and MicroProlog the slowest. Basic's performance is remarkable, being not far behind the pre-compiled languages BCPL and Pascal.

All the languages tested here were obtained from Acornsoft; unfortunately few other manufacturers have seen fit to publish languages for the BBC microcomputer, so these six represent most of the somewhat restricted choice available.

However, I would be pleased to receive timings for other languages from interested readers, and they will be presented in a future update article in *Acorn User*.

```
SECTION "PROGA"
GET "LIBHDR"

LET start() BE
$( LET t,int = ?,?
   t := TIME()
   WRITEF( "tak(18,12,6)= %N*N", tak(18,12,6) )
   WRITEF( "Time= %N*N", TIME()-t )
$)

AND tak(x,y,z) = y<x -> tak(tak(x-1,y,z),tak(y-1,z,x),tak(z-1,x,y)),z
```

Listing 6: BCPL provides a concise way of writing the function

```
 10 REM MACHINE-CODE VERSION OF TAK FUNCTION
 20 DIM code% 1000, stack% 1000
 30 x%=0:y%=1:z%=2: REM parameter stack positions
 40 GOTO230
 50 REM Define Macros
 60 DEF FNhi(i%)=stack%+1+2*i%
 70 DEF FNlo(i%)=stack%+2*i%
 80 DEF FNdec(i%) REM decrements word i% on stack
 90 [      LDA FNlo(i%),X
100        SEC
110        SBC #1
120        STA FNlo(i%),X
130        LDA FNhi(i%),X
140        SBC #0
150        STA FNhi(i%),X
160 ]: =pass
170 DEF FNmov(i%,j%) REM copies word i% to j% on stack
180 [      LDA FNlo(i%),X
190        STA FNlo(j%),X
200        LDA FNhi(i%),X
210        STA FNhi(j%),X
220 ]: =pass
230 REM Main Program
240 FOR pass=1 TO 3 STEP 2
250 P%=code%
260 [      OPT pass
270 .tak
280 \ on entry X-reg points to parameters
290 \ on exit X-reg points to result
300        SEC
310        LDA FNlo(y%),X
320        SBC FNlo(x%),X
330        LDA FNhi(y%),X
340        SBC FNhi(x%),X
350 \ Carry clear if x%>y%
360        BCC else
370        OPT FNmov(z%,0)
380        RTS
390 .else INX: INX: INX: INX: INX: INX
400        OPT FNmov(-3,x%)
410        OPT FNmov(-2,y%)
420        OPT FNmov(-1,z%)
430        OPT FNdec(x%)
440        JSR tak
450        INX: INX
460        OPT FNmov(-3,x%)
470        OPT FNmov(-2,y%)
480        OPT FNmov(-4,z%)
490        OPT FNdec(x%)
500        JSR tak
510        INX: INX
520        OPT FNmov(-3,x%)
530        OPT FNmov(-5,y%)
540        OPT FNmov(-4,z%)
550        OPT FNdec(x%)
560        JSR tak
570        DEX: DEX: DEX: DEX
580        JSR tak
590        OPT FNmov(0,-3)
600        DEX: DEX: DEX: DEX: DEX: DEX
610        RTS
620 ]: NEXT
630 REM Call routine
640 !stack% = 18: stack%!2 = 12: stack%!4 = 6
650 X%=0: TIME=0: CALL tak
660 PRINT"TAK(18,12,6)="; !stack% AND &FFFF ;" Time="; TIME
```

Listing 7: Machine code provided a baseline to measure the others' performance


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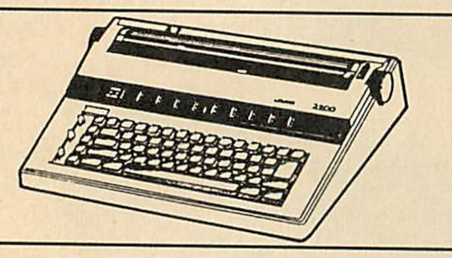
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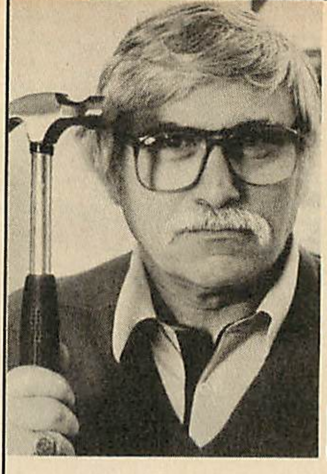
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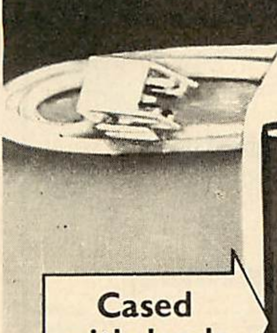
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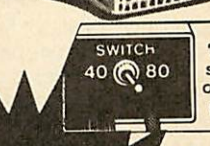
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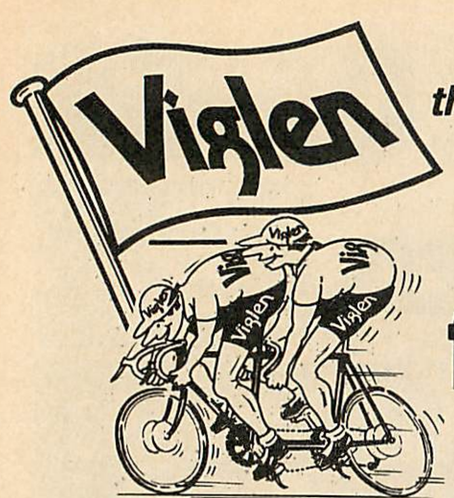
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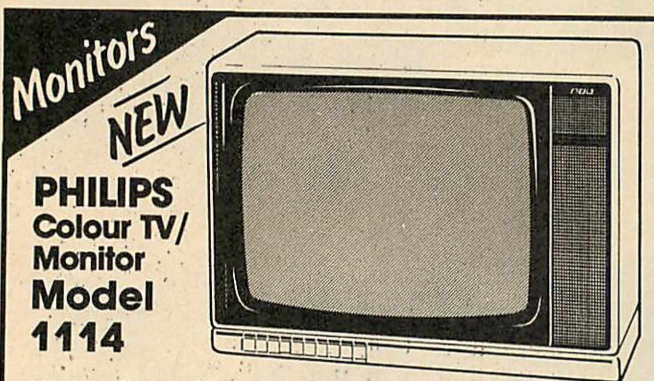
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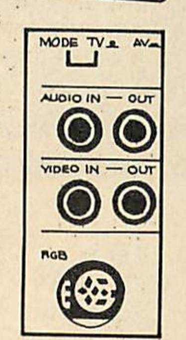


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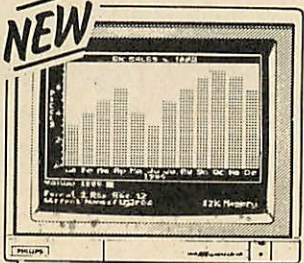
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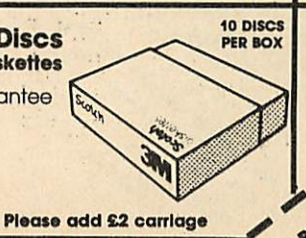
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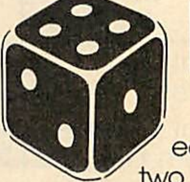
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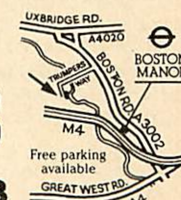
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FOR SALE. Cumana 40-track single sided/ single density 100k disc drive, includes leads, manual, formatting disc. Bargain £80 ono. Tel: 01-650 3675 after 5.30pm. Ask for Barry.

BBC owner wanted to exchange programs, ideas, tips etc. Have also got a Kenda DMFS kit for sale. Single and double density, with manual and utility disc. £50. Please phone 01-968 3454.

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BBC Microcomputer Disc Companion by Tony Latham, essential reading for disc drive owners, £7.95 new, accept £6.25, inc. P&P. 54a Moor Crescent, Gosforth, Newcastle-on-Tyne NE3 4AQ.

SEIKOSHA printer for sale. Also lots of software including Elite, Mr EE, 737, Fortress, together with several ROMS, including View, Graphics ROM, screen dump and lots more. Will split. 0341 281 029 evenings.

WORDWISE ROM plus manual for BBC B, £30. Ring Bill 0634 30451 (Medway, Kent).

ATOM 12kx12k FP, Acorn disc drive, A&F toolkit Atomcalc Wordpack ROMS, books, unfitted memory, colour cards, B/W TV, lots of software. Reasonable offers, may split. Tel. 05645 2220 (Midlands).

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CHIPS Surplus 6264 RAM two for £7.50 or one for £4. Also 8271 available at £47. All prices include postage and packing. Ring Paul on 0635 49644 between 5pm and 7pm weekdays.

WANTED BBC disc owner (40 or 80 track) to swap info, tips, software, etc. Please contact Andrew, 431 Normanby Road, Normanby, Middlesborough, Cleveland TS6 0ED England or phone 0642 453098 evenings.

MERLIN Scribe and Database (Datascribe) £45. Solidisk 32k sideways RAM board £35. Kayde light pen £10. All complete with software. Can fit if needed. Wilson, 2 Duncan Drive, Wokingham, Berks. 0734 782056.

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■ **Centronics 739** Printer ROM dumps colours shaded *command, printer control, *Wordwise* Fkeyset, manual utilities, (tape/disc) £25. Electrocomp, 5 Polden Close, Farnborough GU14 9HN. Tel: (0252) 510486.

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■ **Sideways RAM** 16k for BBC. Easy to fit, no soldering. Utilities software included. £19.95 inc p&p. RJR Electronics, 37 Heworth Green, York YO3 7SX.

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■ **Torch Graduate** IBM compatible upgrade for BBC. Almost unused. Cost £579, accept £480 ono. Psion Software. Shearer, 2 Newton's Mews, Hungerford RG17 0HN. Tel: (0488) 84443.

■ **RML** to BBC £12. BBC to RML £14. Disc software. Transfer any length file between the two machines. Cheque/requisition: Foxsoft, 1 Vinegarth, Epworth, Doncaster DN9 1SW.

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■ **New Wordprocessor** for B, B+ and Master. Easy-to-use with on-screen underline, italic, etc, and scriptwriting mode. Only £17.50 (5.25in 40T disc, 20pp manual, p & p) or sae for details from M Scarlett, Stable Cottage, Berry Hill, Taplow, Maidenhead, Berks SL6 0DA.

■ **BBC model B Plus** (64k). 1770 DFS. Only five months old. Still under manufacturer's guarantee. Little used. *ViewSheet* fitted. £400. Tel: Cirencester (0285) 860549.

■ **Sideways RAM** print buffer with reprint facility, £5. No ROMs to fit, supplied on 40/80 dual format disc. For RAM without automatic write-protect. Utilities included. SMP Computing, 19 Hampden Hill, Ware, Herts SG12 7JX.

■ **Micro Transmitters.** Transmits all voices and sounds to any VHF/FM radio up to six miles away. Complete kit + plans £6.99. Send cheque/po: S Ross, 6 Hanslope Walk, Manchester M9 1JE.

■ **Sideways RAM** software. Range of cheap ROM images available, includes help ROM images, SWR toolkit and others. Please write for details. R Johnson, 29 Pretoria Rd, Cambridge CB4 1HD.

■ **Micro-Trivia.** New trivia quiz game for the BBC. Menu-driven. Questions on nature, TV/film, and trivia. Only £4 tape, £6 disc. A M Smith, 19 Borough Road, Dunstable, Bedfordshire LU5 4BZ.

■ **Sideways RAM** machine code monitor, multi-function includes backward scroll during powerful disassembly, OScalls printed, eg, JSR OSbyte, JMP(USRY), full screen editing, memory dump. Special feature timer (no. cycles taken by subroutine), binary displayed registers status, command pages. Page ROMs displayed. £4.95 tape, £6.95 disc, 40 track, + 50p p/p. G White, Anker Videos, 116 Weddington Road, Nuneaton, Warks.

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■ **Walters WM2000** M-C screen dumps for BBC B. Compatible with 6502 2nd processor. Multi-tone dumps for modes 1, 2 and 5. B&W dumps for all graphics modes, but no dump for mode 7. SAE for details or £11 for disc, stating 40 or 80 track, to Dr A Cownie, 7 Chatsworth Road, Worsley, Manchester M28 4NU. Tel: 061-794 2510.

■ **Name Address** Program. Reference search. Part searches on name. User friendly. (40/80 disc). £6.25. J Edwards, 21 Dalton Crescent, Shildon, County Durham. Tel: (0388) 772029.

■ **Cumana** 40 track S/S drive own PSU 100k £39. Tel: 01-858 6086, evenings.

■ **AC Circuit analysis.** New program, menu driven, 30 nodes, transformers, frequency sweeps, pulse response, alternative values, £60. Details from Markie Enterprises, 17 Percy Road, Shepherds Bush, London.

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Please include your cheque for £11.50 (inc. VAT) made payable to Redwood Publishing (please note: no POs; cheques only). This is the standard fee. Don't forget your name, address and phone number. Send cheque plus form to Acorn User Small Ads, 141-143 Drury Lane, London WC2B 5TF. Please print clearly.

ACORN USER'S

DIARY

Sugar: the sweet smell of success

We sent ace reporter Max Headline, 25, behind enemy lines to wade through the clichés surrounding Sugar and Sinclair . . .

I was in the office, bouncing paper balls on my bald bonce and reliving the glories of the World Cup with my *Acorn User* database when the phone rang. 'Hot scoop!' Big Ed chewed down the line. Leaping to obey, I caught the bat pole to St Catharine Dock and was back in five minutes with a double scoop of pistaccio and hot fudge sundae on a stick.

I walked in. He swivelled round on his shiny black chair and tried to smile: but the friction of sudden movement on hot sweaty plastic or the pain of parting with 85p was too much. He grimaced instead and nodded towards the large black barrier of a desk between us. 'Seen this?' he asked. 'No,' I lied (many's the time Winchester and I had planned an SAS raid to steal that desk).

He slid today's copy of *Yesterday* towards me. I glanced at the paper, but didn't look too hard. That's one thing you learn about this business – don't look too hard or you end up not getting invited to the good lunches, or worse still, editing *Nationwide* (and I bet you haven't seen that recently).

'Sugar's bought out Sinclair for 5k.' Big Ed gnashed out the words as if chewing a brick, while the red-painted end of his Superman ciggy seemed to write them in the air. I knew he meant Mbucks rather than kbucks, but didn't try to correct him. (That computer magazine with a man in a gorilla suit on the cover had a lot to answer for.)

'Get on to it.' He swung back to look up the latest pattern on the Econet's knitting circle.

I did. Sugar was a hard nut to crack. The place was like a fortress – high security, bolts on every door. But I got in. He was another vinyl-mounted swiveller. The man who ate Sinclair for breakfast (for the price of a business lunch) was surrounded by his five generals in an open plan penthouse bunker. The flashing lights and chrome knobs of a million cassette decks blinked at me from the walls. He introduced his aides de camp one by one: Tommy, Dusty, Bruce, Larry and Bernie.

I felt like Uhura trying to take notes from Kirk on the bridge of the Enterprise.

Although there were no windows, I knew it was getting late and there was a deadline to meet. I mentally pulled down my dress, tried to look like that bloke in the *Pagemaker* ads and fired the first question: 'Maxwell pulled out, you followed through. Why?'

A short, sharp reply: 'The price was right.'

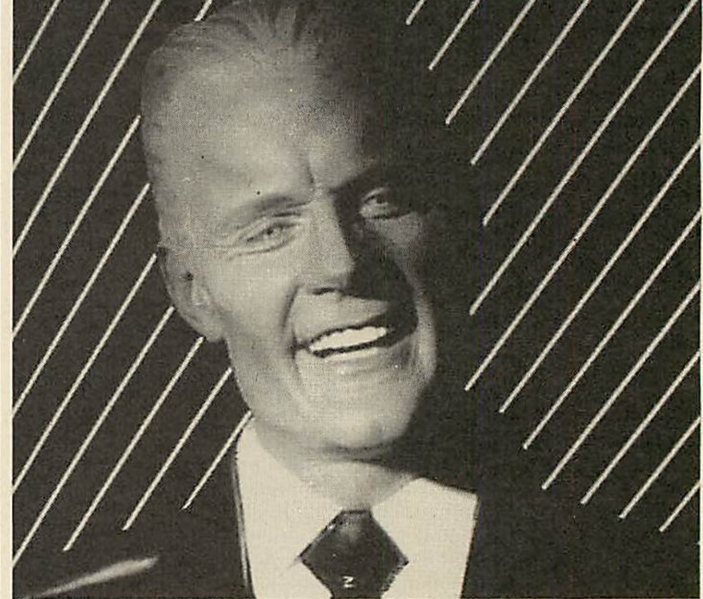
'What did you say to Sir Clive?'

'Come on down. He came, I saw, we settled.'

His chat was like his hardware: no messing about. You felt you'd seen it all before, but it was so cheap you couldn't resist. He made notes with a cheap ballpoint on single sheets of paper with a sheet of glass underneath.

'It was that simple?' I queried.

'Just like that.' As he spoke a red flowerpot hat seemed to appear on his head. I blinked and it was gone.



Intrepid reporter Max Headline before his clichéd encounter with Sugar

The phone rang. He picked up the receiver in a bear-like hand and answered: 'Hello, Boo Boo. Yes. Yes. Magic.' End of call.

I began again: 'Will Sir Clive have any say in things?'

'I'm in charge.'

Tommy's phone range. We went quiet as it was answered. Tommy said: 'It's for you: Jimmy, the catering manager.'

Sugar picked up the extension: 'What's the recipe today, Jim?' He listened, then gave his verdict: 'I like it. Not a lot, but I like it.'

I picked up where I left off: 'You've now got two companies, do you plan to leave it at that or go for another?'

He sneered. 'I'm going for broke. You don't get anything for a pair, not in this game. We're looking at the hi-fi side again. Seen our latest CD player?'

I hadn't, so he gave the nod to Tommy who wheeled one out and the sweet melodies of Bach drifted through the office. 'Put the rock on, Tommy.' Tommy did and we were blasted by Rudolph Carnap and the Logical Positivists of the Vienna Circle.

'That's Rudolph isn't it,' I said.

'Yes,' replied Tommy. 'He's a nosey Red if you ask me. Doing all right at the moment, but he's destined for a short reign, dear.'

Sugar suddenly growled. 'Pen's run out. Now where's my bin?' There wasn't one so he threw the pen to Dusty shouting: 'Dusty, bin!'

He turned to me: 'I've got to go.' I found myself adding, 'And when a man's gotta go . . .' He offered a hand and said: 'Nice to see you.'

Behind him, Bruce chirped up, 'To see you, nice.'

I replied, as if in a trance: 'May the force boldly go with you. I'll see myself out.'

Larry shouted a farewell greeting: 'Shut that door.'

I passed through the door, and shut it firmly behind, feeling I'd heard it all before.

Talkative lot I thought, except for Bernie who sat by the door. As I walked away I heard Sugar's voice behind the closed door: 'Bernie, the bolt.'



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